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SAWYER-MAN ELECTRIC CO.,

COMMERCIAL AGENT OF THE CONSOLIDATED ELECTRIC LIGHT CO.

No. 510 West 23d Street, New York,

August 1st, 1888.

To all Users of Incandescent Lamps:

Experience has demonstrated that the life and utility of the Incandescent Electric Lamp is increased and the cost of its manufacture diminished by a decrease of the electromotive force. We have, therefore, decided to divide our commercial lamps into three classes, viz: HIGH, MEDIUM, AND LOW VOLTAGE LAMPS; of which classes, 100, 75, and 50 volts, respectively, shall stand as the types.

THIS COMPANY, THE FIRST TO GIVE TO THE CONSUMER THE BENEFIT OF SUCH CLASSIFICATION, IS ENABLED, BY REASON OF INCREASED MANUFACTURING FACILITIES, AFFORDED BY THE ENLARGEMENT OF OUR NEW YORK AND PITTSBURGH FACTORIES, AND BY REASON OF VALUABLE IMPROVEMENTS MADE IN THE LAMP, TO OFFER THE FOLLOWING REDUCTION IN PRICES FOR LAMPS WITH OUR

STANDARD BASES

SUBJECT TO DISCOUNTS FOR CENTRAL STATION USE AND TO PURCHASERS OF ORIGINAL PACKAGES OF 250 EACH.

C. P.	50 Volt.	75 Volt.	100 Volt.
16, and under,	$0.70	$0.75	$0.80
20,	.75	.80	.85
24,	.80	.85	.90
32,	.90	.95	1.00

THREE CENTS WILL BE PAID FOR THE RETURN OF EVERY LAMP BASE WITH THE PLATINUM WIRE INTACT, DELIVERED IN GOOD ORDER AT EITHER OF OUR FACTORIES.

For the purpose of obtaining uniformity of production, and of reducing the cost of manufacture, we offer to purchasers of our lamps our Standard Sockets, without charge, in exchange for any other socket in use by them.

CORRESPONDENCE SOLICITED.

SAWYER-MAN ELECTRIC COMPANY.

ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

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Bone-Cutting by Electricity.

Removal of sections of bone in surgical operations has heretofore been a long, tedious process, effected with a mallet, chisel, gouges, &c. It is, perhaps the most brutal and unscientific method which could be adopted, and sounds like the operative butchery which existed in the last century. This has all been reformed by an invention called the electric osteotome, says the London *Electrical Engineer*, which is an instrument holding a circular saw at its extremity, revolved with lightning speed by an electric motor. This, when held against a bone, makes a clean cut through it in a few seconds; in fact, its action is instantaneous. By holding the osteotome in a slanting position, wedge-shaped pieces can be cut out with equal promptitude. There is no danger of the saw cutting the soft parts as they are protected by a retractor, an instrument which is passed down and under the bone.

An Interesting Trade Mark Decision.

Vice-Chancellor Vanfleet, of New Jersey, rendered a decision on July 24, which is of much interest as affirming the true legal status of a trade mark. The Cigarmakers' International Union have a label which they authorize any manufacturer of cigars employing members of their association to use on his packages or boxes. The label has been counterfeited, and suit was brought, under the trade mark law, against a manufacturer alleged to have used such labels. The defense was made that no cause of action was shown, and that the label was no trade mark.

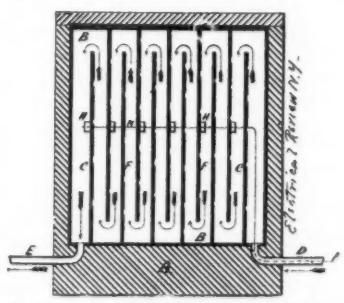
The court sustained the latter ground of defense. It affirmed that a trade mark must have three characters. It must be new as regards the article to which it is applied; it must be applied to some article of traffic; and the proprietor must put upon the market his article marked with the trade mark. No person can acquire right to a trade mark unless he puts merchandise or a vendible commodity on the market, marked or distinguished by his particular mark. As the complainants had not shown that they ever placed the label upon their own goods, their complaint was without force. The court held that mere adoption of a mark and a public declaration that the mark so adopted will be used to distinguish goods to be put on the market at a future time, creates no right.

The Brussels Exhibition.

Some additional details which have come to hand respecting the electric lighting of the Brussels exhibition may prove of interest. The interior of the exhibition is lighted by 500 Khotinsky incandescent lamps, of 18 candle-power each, and by 244 arc lamps, ranging in candle-power from 1,500 to 2,500. The arc lighting of the buildings is done by the Société Thomson-Houston, MM. Bouckaert and Schuckert, and the Industrielle and Electrique Companies. In the grounds the lighting is divided between M. Pieper and the Anglo-American Brush Corporation. Pieper's installation has been working some time to a partial extent; but owing to their being a deficiency of boiler power the total number of lamps installed have not been regularly in work. The Anglo-American Brush Corporation have 58 lamps of 2,000 candle-power in operation every evening. These are distributed as follows: 10 in British section, six at the switchback railways, six on the high mast opposite the entrance from the Rue de la Loi, and 18 on independent masts all round the grounds; 18 lamps are set apart for the illumination of the arena, which was originally intended for the performances of the hippodrome. These, however, came to an abrupt termination, but the lamps are still in use and effect a very useful purpose, as they light up a large space which is the principal thoroughfare from the exhibition buildings to the grounds and bring into relief one of the most beautiful architectural features of the exhibition. Some 600 horse-power is altogether employed in driving the electric light machinery, 350 horse-power being used for the lighting of the interior, and 250 horse-power for the lighting of the gardens.

Apparatus for Treating Noxious Gases with Electricity.

Hartley Fewson has patented an apparatus intended to render sewer and other gases harmless and incapable of assisting in the decomposition of animal matter. The sewer or other noxious gases are drawn by a fan or other suitable apparatus from the drain containing the same and are forced through apparatus of special construction. This apparatus consists of a box supported on glass blocks and lined with glass. This box is fitted with inlet and outlet pipes at its opposite ends and with glass partitions arranged so that the gases take a zigzag course

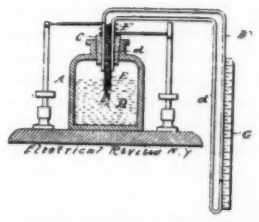


APPARATUS FOR TREATING GASES BY ELECTRICITY.

from the inlet to the outlet. Each glass partition is covered on the inlet side with tin-foil. A small platinum wire passes in front of each sheet of tin-foil, but at a short distance therefrom. A similar wire passes in front of the glass side of that plate nearest the outlet-pipe. Two insulated electrical conductors are led into the box, and the platinum wire in front of the plate nearest to the inlet-pipes and the wires in front of each alternate plate are connected to the positive conductor. The remaining wires, including the one opposite the glass side of that plate nearest the outlet-pipe, are connected to the negative conductor. The conductors are connected, respectively, to the positive and negative poles of an electric generator. The gases in passing through the apparatus are thus subjected to electrolysis and are decomposed and form fresh combinations, oxygen being liberated from sewer or other noxious gases and ozone being formed at the last glass partition. The resultant gases delivered from the apparatus are passed into water, the oxygen vitalized by the presence of ozone, and the nitrogen rising up through the water and being discharged in a harmless state.

Another Electric Meter by Prof. Geo. Forbes.

Mr. Forbes, of London, has just patented another simple meter. The invention consists in passing an electric current through a conductor and thereby heating the same, evaporating a liquid contained in a closed vessel by the aid of said heat, receiving and condensing the vaporized liquid in a separate vessel, and finally measuring the amount of



PROF. FORBES' METER.

liquid so condensed to determine the amount of current which has passed through the said conductor.

The operation of the apparatus is as follows: The coil F, having been placed in circuit with the conductor conveying the current to be measured, becomes heated by the passage of the current. The liquid in vessel A is absorbed by wick E, and the heat from the coil F produces an evaporation of the liquid in the wick. The vapors created pass over into the leg *d'* of tube D', and therein condensed, and the amount of liquid collected in said tube serves as a measure of the quantity of electricity which has passed through the coil. The quantity of liquid thus condensed may be ascertained at any time by consulting the scale G.

Good-Bye to Gas.

A workman at Greenville, S. C., visited the city gas lamps last week, removing their burners and cutting them off as available sources of street illumination. The action was in accordance with an order from the chairman of the street committee of the city council, instructing the gas company that the council would have no further need for the gas-light in the streets, and to cut off the city's supply, beginning Wednesday night, the first day of the new month.

This closes the reign of gas as the public illuminator for Greenville, and leaves for the new and modern Brush electric lights the duty of filling the thoroughfares with brightness. It is a long jump forward in the march of improvement, and one in which Greenville has led the way in that State.

Testing Cheap Fuel.

For some time past, experiments have been going on at the Bath (Me.) electric light station, for the purpose of finding out the practicability of burning sawdust in the furnaces there, and the results have proved so satisfactory that this form of fuel will be used at the station hereafter. The sawdust is supplied by Shaw's mill through a large pipe of galvanized iron, one foot in diameter, which is run from the saw pit to the station. A powerful artificial draught is established through this conductor and the dust is blown from one building to the other. The benefit derived from this new departure will be twofold. It will enable the station to secure an abundance of cheap fuel landed directly before the furnaces, and give the saw mill a chance to get some profit out of material which was comparatively worthless.

Indians and the Telegraph.

A friend of mine, says a correspondent, writes to me that he had a visit from some Indians in the telegraph office in which he works, the other day. The telegraphers tried hard to make the Apache brain grasp the extraordinary attributes of the electric fluid, but of course with very little success. The Indians did not enthuse a little bit when they were told that some white men, living in a town 100 miles away, had sent their compliments to the Indian chiefs. They imagined that it was all a fabrication of the deceitful white man.

In fact they would have departed with a poor opinion of the invention of Morse and all the other claimants thereof, had not somebody proposed to give them a galvanic shock. This utterly puzzled and at the same time delighted the Indians, who grasped the wire and shouted like schoolboys when the current made them tingle from head to foot.

But, after all, they were really more impressed by some big rubber bands which one of their number found on a desk, than by anything else. They appeared to never tire of testing the elasticity of these bands, drawing them out and letting them fly back with a jerk; and when they departed, each red-skinned warrior carried away a box of them.

Electrical Engines.

There are a number of stationary electric engines in use in New Haven which attract great attention, says the *Register* of that city. So mysterious is the application of the electric power that the owners have their time pretty well monopolized in explaining the details, but even then there are not many who can understand the work of this mysterious agency which many think will revolutionize motive power. There are some in that city who claim that within the next 20 years railroad trains will be propelled between New Haven and New York by electricity.

One of the engines has just been placed in the gun shop of N. D. Folsom & Co., Crown street. These electrical engines can be made with a maximum power of 40 horse. The small engine at Folsom's is only half a horse-power. It is contained in a small box about three feet long, two feet wide, and two feet high. The electric current is supplied from the wires of the New Haven Electric Company. The wheel on the engine shaft usually known as the balance wheel is only about four inches in diameter. This small diameter is necessary because of the frightful velocity with which the engine runs. There is a lever which regulates the force of the electrical current. When the current is turned on at full strength the wheel revolves at the rate of 2,000 per minute.

The engine at Folsom's, which has just been put in, has been inspected by many visitors.

—— At a meeting of the Richmond, Va., City Council last week, a letter was read by Mr. Campbell, from a representative of the Brush Electric Light Company, recommending that instead of spending $25,000 to enlarge the gas works, that the city construct an electric light plant of its own, the cost of which will not exceed $35,000. This was referred to the Committee on Electric Light.

The Burton Electric Heater.

THIRD AND LAST PAPER—A NEW COMBINATION — FIRST ENDORSEMENT OF THE HEATER—EXPIRATION OF THE OLD PATENT — A NEW PATENT ISSUED—THE HEATER IN OPERATION.

To the Editor of Electrical Review:

Although the exhibition of the heater at Philadelphia had inspired the inventor with a certain degree of hope, another trouble now faced him in the fact that the patent issued in 1869 would expire in two years. Therefore, if even a favorable report should be made on it by the exposition jury, the chances were against capitalists investing money in it, unless an extension of the patent should be granted by Act of Congress. Moreover, a bugbear existed in the fact that there was a possibility of the old shareholders, in case the invention should prove to be of value, coming forward and making claim to the profits, although they had, as before stated, practically abandoned it. In order to sound them on this point, letters were addressed to each; and, although the majority renounced all claim to the profits of the invention, a sufficient number remained obdurate to cause trouble should the occasion arise.

Through the courtesy of its editors, the New York Electrical Review in its issue of December 20th, 1884, published a description of the heater exhibited at Philadelphia; and here the inventor will take the opportunity of expressing his appreciation of the many acts of kindness extended to him from that time to the present by that able and liberal minded journal.

During the same month, Mr. Wm. P. De Saussure, a young lawyer of Richmond, but a native of Charleston, S. C., and a member of an honored and well-known Huguenot family, called on the inventor and, after a long conversation on the subject of the heater, proposed to address a letter to Capt. Hugh R. Garden, counsel and vice-president of the Consolidated (Sawyer-Man) Electric Light Company, calling his attention to what he considered its merits. Capt. Garden, in reply, stated that he would be glad to look into the matter, and suggested that a model should be sent him, he having at hand every facility for making a test of it. Later, it was decided that the inventor should go to New York and be present at the tests; and, as the heater exhibited at Philadelphia was still in that city, he addressed a note to Prof. Edwin J. Houston for the purpose of learning if he could get possession of it. In reply, Professor Houston wrote as follows:

Philadelphia, Dec 8th, 1884.

Dr. W. Leigh Burton,
Richmond, Va.

My Dear Sir: In reply to your favor of the 3d inst., I will say that I have believed from the first that your heater contains the germs of a great invention.

I am so very uncertain as to when I could do anything experimentally with the same that perhaps it would be best for you to send it to the New York party. If he does nothing with it, send it back to me.

If you advise me, I will ship the same to you. Yours very truly,

Edwin J. Houston.

The above letter was a most agreeable surprise, inasmuch as it contained *the first endorsation of the heater from a thoroughly scientific source.*

Attention is also called to the second paragraph of this letter, as the removal of the heater soon after prevented those experiments with it which Professor Houston contemplated making, and which undoubtedly would have influenced any jury in making a report on it.

In January, 1885, it was decided that the inventor should go to New York so as to be present when the tests above referred to should be made, and that he should stop in Philadelphia long enough to get the heater and take it along with him. When he arrived in Philadelphia, he learned from Professor Houston that he had been expected the evening before, and it having been arranged *that a lecture* should have been delivered at the Franklin Institute on his heater, his non-arrival had caused it to be postponed. Here, then, was another disappointment which it was impossible to foresee, as it had been occasioned by the train from Richmond being several hours behind time; but as the "postponed" lecture was evidence of the favor with which the heater was now regarded in high scientific circles, the journey to New York was resumed with actual hopefulness.

When the inventor arrived in New York, it happened that the Sawyer-Man Company had engaged the services of Mr. E. G. Acheson, an expert, for the purpose of making certain experiments in the line of their electric lighting system, and Capt. Garden, considering the possession of the heater fortunate at the time, proposed that this gentleman should take it in hand and "find out what there was in it." Therefore, Mr. Acheson subjected it to a series of tests, and made a highly favorable report on it. Finding by measurement that the heater had an electrical resistance of seven ohms, he calculated that a mechanical energy of *one horse-power* would generate a current from a dynamo sufficient to heat to the required temperature, *fifty such as this.* The calculation here given, if correct, would at once have established the feasibility of the heater; but, as an offset to this, Mr. E. W. Rice, representing the Thomson-Houston Company at Lynn, Mass., forwarded to Capt. Garden, a few months after this, an elaborate calculation to prove that it would require a mechanical energy of *forty horse-power to heat, by means of electricity, one small room!*

These two opposite opinions could but have the effect of creating a certain distrust as to the practicability of the heater; and though both may have been, and undoubtedly were extreme, the unfavorable one had, as may be supposed, the greatest influence with its new found friend.

On the whole, the visit to New York was encouraging, and it was there determined that an application should at once be made to Congress for an extension of the patent issued in 1869.

With his characteristic energy, the Hon. Geo. D. Wise, representative from the Third Virginia District, soon had the bill presented and referred to the appropriate committee, and in a short time it was unanimously recommended for passage. The Hon. John S. Wise, then Congressman-at-large from Virginia, also took an active interest in the bill; and, though differing politically from his colleague it was arranged that he should "call up" the bill when the proper time arrived. The time next being fixed for "catching the speaker's eye," the bill was called up, but as there were thirteen "objectors," *it was killed for that Session!* One of the leading objectors to the passage of this bill was Hon. John A. Anderson, of Kansas; and though every honorable means was taken to cause him to change his views as to the merits of this particular case, he was inexorable, as he took the ground that if a man could not make all out of a patent that it was worth in seventeen years, it was his own fault.

Notwithstanding the fate of the first application, the Hon. Geo. D. Wise presented another at the next Session of Congress. No attempt, however, was made to call up this bill, and on the 23d March, 1886, "at noon," the patent of the Burton electric heater, issued in 1869, had expired!

Realizing the uncertainties attending the fate of private bills in Congress, the inventor was by no means unprepared for what he then considered a gross injustice to an invention that had been acknowledged to be "fifteen years in advance of the times;" but when certain events occurred later on, it will be acknowledged that he had cause to be congratulated on this action of Congress and the obduracy of Mr. Anderson, of Kansas. Before the fate of the application for an "extension" had been known, he had instituted a series of experiments in electric heating on a line which was considered by some persons in opposition to common sense and scientific principles.

He proposed, in short, to do away entirely with the reservoirs or radiators of heat as used in the old patent, and employ a continuous resisting medium; and to prevent this continuous resisting medium from being burned under a powerful electric current, he proposed to cover the wires with dry, powdered fire-clay, or its equivalent. In order to show how this proposition was regarded in a certain quarter, a gentleman, under date of December 15th, 1885, which will be noticed as being several months before the expiration of the old patent, wrote:

* * * "I do not understand the ground for your plea that the surrounding of the small conductor with a non-conductor of heat will prevent the burning of the wire by the dynamo current. It would naturally seem that the effect would be the reverse."

Such, in fact, was the opinion of nine-tenths of the people who had never seen a similar experiment tried, but the inventor had had some experience with the old heater, and had noticed that although it was possible to melt the platinum connections between the copper blocks, it never occurred where the wire was covered with the plaster of paris used in holding the heating coil in position.

It was not, however, until early in the next year that a practical test was made. A heater was constructed having a casing of sheet iron, 14x16 inches, and one inch depth. In the bottom was placed a sheet of heavy asbestos paper having on its opposite edges hooks for holding the wire. Coming through holes in the box at opposite ends were two large copper wires for connection with a dynamo, and to which, on the inside, the small resisting wire was attached. A considerable length of small brass wire was then obtained, and, commencing at one end, the attachment was made to the large wire, and the small wire then reflexed around the hooks at intervals of about three-eighths of an inch, until connection was made with the large wire at the other end. The apparatus at this stage resembled a sort of musical instrument with metallic strings; and the next thing to do to make it ready for a test was to *cover the wire with powdered fire-clay* and fasten on the top. This heater contained a length of about 70 feet of No. 27 brass wire, and its electrical resistance was ascertained to be 15 ohms.

When a test was made, this heater was put in circuit with 15 arc lamps, the current being furnished by a "Schuyler" dynamo, this machine being used in Richmond for street lighting. In a few minutes the heater was warm, in ten minutes it was hot, and in fifteen minutes the moisture in the fire-clay, caused by ordinary absorption from the atmosphere, *was converted into steam* and rushed out with a hissing sound through the cracks in the box. But as a thorough test was determined on, the connection with the dynamo was continued until, finally, when an attempt was made to remove the heater by placing a twine string around it, *the string was burned in two.*

This indeed looked like "plucking the flower of victory from the thistle of defeat," and Capt. Garden was at once notified of the success of this test. That gentleman took steps to make an immediate application for a patent in the inventor's name, and by a singular stroke of good fortune to the inventor, Prof. Edwin J. Houston was requested by Capt. Garden to prepare the specifications. The application for this patent was filed April 23d, 1886, but was not allowed until November of the same year, and finally issued bearing the date of February 15th, 1887.

So there was again a "Burton Electric Heater" covered by a patent, and by a fortunate train of circumstances, it was destined to have its practicability put to a test in an entirely unlooked for manner.

In May, 1887, a party of northern capitalists, backed by a number of our well-known citizens, made application to the Common Council of Richmond for a franchise to construct certain lines of street railway, and, in the same petition, asked for authority to use electricity as a propelling power in place of mules or horses. After the usual delay in such cases, the franchise was granted, and soon it was known that the corporation asking for these privileges was to be termed "The Richmond Union Passenger Railway Company." Ground was at once broken for the railway, and in a short time a corps of electricians from the Sprague Electric Railway and Motor Company arrived in the city to construct such portions of the great work as might be allotted to them, under the direction of Lieut. S. Dana Greene, a graduate of the Annapolis Naval Academy, then on furlough.

While the matter of the electric railway was before the City Council, the inventor being present, he was introduced to the officers of the company by Col. W. E. Cutshaw, city engineer, and in the course of time the heater was fully explained to Lieut. Greene.

He at once recognized its merits, and on his recommendation, before even a test was made, a contract was entered into with the railway company by which they were to bear the expense of all tests, and in case of their adoption of the heater to have the exclusive use of it on all their lines within the City of Richmond.

In accordance with this contract, a practical test was made on a car of this company, commencing on the 30th January last and continuing several months; and when it is added that all the cars of this line will be equipped with these heaters during the coming winter, it would seem that the feasibility of the invention had been established beyond question.

Hundreds if not thousands of people in Richmond rode in this, the first car heated by electricity; but none could feel the satisfaction of the inventor at the seeming "poetic justice" in the fact *that this car should pass by the very house that had been the scene of his early disappointments, and at whose door the ominous auctioneer's flag had once drooped its crimson folds!*

To Lieut. S. Dana Greene is due in the amplest measure the credit of demonstrating the practicability and economy of the Burton electric heater. Sharing the enthusiasm of the officers of the railway company at the prospect of their corporation being the first in the world to employ electricity for heating purposes, he entered upon this work with hope; and after the first test had been made, with confidence. Having at his command a superbly equipped electrical plant, it was here shown, by the proper measuring instruments, *that it was possible to warm a car or room by electricity with a use of current representing in mechanical energy three-fourths of one horse-power.*

And now is brought to a close the history of an invention whose vicissitudes may have seemed without parallel, but which have not been exaggerated for dramatic effect. And here, too, should a disclaimer be made of giving offense to those persons whose opinions may have appeared in the form of letters or otherwise, as being unfavorable to the success of this invention, for no one will admit more frankly than the inventor himself, that such were the opinions of some of the leading scientific men of the day as to the practicability of all inventions whose conditions of success depended upon those of the "Burton Electric Heater."

Richmond, Va., July, 1888.

—— The Salem, Mass., Electric Lighting Company has found itself compelled to decline to furnish power to run the Sprague dynamos for the motors which the Naumkeag Street Railway Company propose to use upon its Willow cars. The company has had so many calls for private motors that it fears that the capacity of its engine and boilers would not be sufficient for the horse railroad motors. The company has no interest in one motor more than another, and its action in this case is not with any antagonistic feeling. The wires for the Naumkeag Company's line will be run on the electric light company's poles, and it will only be necessary to obtain boiler and engine power sufficient in some other locality. It is believed this can be done, and that no delay will be caused the Naumkeag Company in getting its cars running. The electric light company would have been compelled to purchase a new boiler and engine, and did not feel that the return would warrant the outlay.

Des Moines, Iowa.—The Des Moines Electric Railway Company has been incorporated with a capital stock of $200,000.

Yonkers, N. Y.—The Thomson-Houston Electric Light Co., has been organized with H. Z. Starke at its head. Capital, $100,000.

Red Wing, Minn.—The Red Wing Electric Light and Power Company, capital, $50,000. G. R. Sterling and others incorporators.

Normal, Ill—The Normal Electric Light Company, capital, $25,000; incorporators, M. T. Burwell, C. L. Gill, H. C. DeMotte, O. Seibert, and Charles DeGarmo.

Clayton, N. Y.—The Thousand Island Electric Light and Power Company, has been organized at Clayton, by H. S. Parker, C. A. Ellis and others, with a capital of $15,000.

Vancouver, W. T.—Electric Light Company, stock, $15,000. David Wall, L. Sohns, B. F. Shaw, Chas. Brown, Wm. E. Maxson, Wm. S. Patton, Jno. O'Keane, incorporators.

Oregon City, Ore—The Oregon City Electric Light Company has been incorporated, to operate lights, telephones, etc., capital stock, $20,000. M. A. Stratton and others incorporators.

Albany, N. Y.—The Telephone Construction Company, to build and operate a telephone and telegraph line from the State of Chili to New York, is incorporated with a capital of $30,000.

Albany, N. Y.—The National Conduit Manufacturing Company became a corporation. The purpose of the company is to build conduits for burying telegraph, telephone and other electric wires.

Richmond, Va.—The Gray National Telautograph Company has been chartered by the circuit court, with a capital stock not to exceed $15,000,000. The principal office will be in Richmond. The officers are: President, Thomas M. Logan; vice-president, Charles E. Coon, of New York; secretary, David I. Carson, of New York. Among the incorporators are United States Senators Plumb and Hale, John H. Inman, George S. Scott, C. S. Brice, J. B. Pace and James H. Dooley. The company will engage in the general telegraph and telephone business, under the system invented by Professor Elisha Gray.

—— The Northwest Electric Construction and Supply Company are installing in the house of Mr. W. S. Jackson, Prairie du Chien, Wisconsin, an electric light plant, using the Julien accumulator.

—— The Brush Electric Light and Power Company, of Niagara Falls, have recently increased their plant by purchasing a number of arc lamps. This company is reported to be in a very flourishing condition.

—— The Salinas (California) Gas and Water Company have contracted for a 30 light electric light plant of the Thomson-Houston Electric Company's system. It is expected that the lights will be operation by October 2d.

—— At Lexington, Mo., the proposition of Edward Abendroth to establish an electric light plant, provided the Council would grant him permission to erect the poles and string the wires, has been accepted by that body. This will give to Lexington another metropolitan feature, of which it has as many as any place of its size in the State. It is possible the Brush light will be used. Representatives of that company, with whom Mr. Abendroth has been in correspondence, will be there in a few days to look over the field.

Testing an Electric Car.

A large party headed by President Whitney and the directors of the West End Railway, joined in experiments with the Thomson-Houston system of electric cars at Crescent Beach, and inspected the works of the company at West Lynn, Mass., says the Boston *Transcript*. On the arrival at the beach the electric motor car, which for some weeks past has been running on Atlantic avenue, was found attached to two ordinary street cars. It was learned that the weight of the motor car was 9,500 pounds when empty, and when occupied by 47 passengers was 17,000 pounds, 8½ horse-power being required to move it 12 miles an hour. The weight of the three cars was 19,500 pounds, and with the 79 passengers, 32,000 pounds. Propelled from an overhead wire, the train moved toward the Atlantic House at a moderate rate of speed, stopping at intervals to test the apparatus for checking motion. By this system the difficulty is avoided of having to adjust the armature bearings at each trip. Another gain is in the use of only one commutator for each motor. There are also self-oiling bearings, the armature turning in an oil cup. In the overhead connection the insulators, it is claimed, surpass others in the completeness with which they save dynamic leakage. When the first trip and return had been made with three cars, two trips were taken with the motor car alone, to permit the party to note the speed which could be safely attained. On the first passage over the track, which is 4,870 feet in length, the rate of speed ranged from 12 to a little more than 13½ miles an hour, and on the second trip it reached a speed of upward of 15½ miles. Among other excellences incidentally discovered during the trip were the mechanical arrangements which prevented the sparking of the track and armature, and the valuable lightning arresters, designed to prevent the burning out, which has been known to occur at Rochester and some other places. After an hour in the dining hall of the Strathmore Hotel, the party, by invitation of the officials of the Thomson-Houston company, visited the works.

Fire From Incandescent Lamps.

At a recent meeting of the Societé Francaise de Physique, M. Mascart described some interesting experiments which he had carried out with a view of determining how far incandescent lamps might be a source of danger when in the immediate vicinity of inflammable materials.

Some 32 candle-power incandescent lamps were tightly enveloped in cloth, others in wadding, with the gummed surface removed, and others again were placed in the folds of some old stage scenery; in no case was there any charring or undue heating.

An extra thick cotton hood placed over a 32 candle-power lamp became charred whenever it was in contact with the globe after 10 minutes had elapsed. A 32 candle-power lamp, which was surrounded by a black silk hood, and then by a black velvet one, set the latter burning gradually in six minutes.

In another experiment two lamps were enveloped respectively in black and white wadding, from which the gummed surface had not been removed, and in two minutes charring commenced, both lamps burst, and the wrappings were set alight.

Finally a 300 candle-power lamp was laid against some old scenery; in a minute and a half the scenery began to char where the globe touched it, and slowly burnt without flame.

... Professor Elisha Gray of Highland Park, Ill., has finally obtained letters patent dated July 31, 1888, for a combination of instruments called the telautograph, consisting of a transmitter and a receiver, and designed for transmitting messages by wire between distant points by the sender's own handwriting, thus doing away with skilled operators. The invention, it is claimed, is based on the discovery of a new principle in controlling the electric current whereby a pulsatory current is produced, all previous attempts to transmit handwriting having been based on use of a variable current.

Walker's Marine Electric Lighting Plant.

The illustration on this page, taken from *Industries*, London, show a new arrangement of electric lighting plant used by vessels when navigating canals or narrow waterways by night; the apparatus consists of two cigar-shaped pontoons supporting a platform, on which are fixed a vertical multibular boiler and high speed engine, coupled direct to a dynamo, and a projector which is placed at the forward end of the raft. When in use the raft is floated in front of the stem of the ship, to receive which a recess is made in the after part of the platform. The latter is made fast to the vessel by means of guy ropes attached to the two winches shown, and in the event of the ship running upon the bank, the operator, on seeing by the deflection of the beam of light that danger is ahead, can, by releasing one of the winches, let the raft swing clear. While in use for lighting, the ship propels the raft; but when the latter is detached, the steam engine can be disconnected from the dynamo, and thrown into gear with a screw propeller fixed between the two pontoons, which arrangement, we are informed, will enable the raft to travel at the rate of four or five miles per hour. A small surface condenser is fitted inside one pontoon, and a reservoir for fresh water in the other. Mr. Frederick Walker is the patentee, and Messrs. Stephens, Smith & Co., of Cuba street, Millwall, are the makers of the raft and projector. In Fig. 2 we illustrate the latter, the lamp in which can be either fed by hand or automatically. In both cases the stem of the lamp consists of a tube, upon which the carbon-holders slide, the mechanism being contained inside the tube and the hollow base.

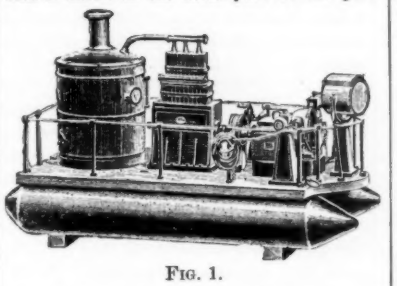


FIG. 1.

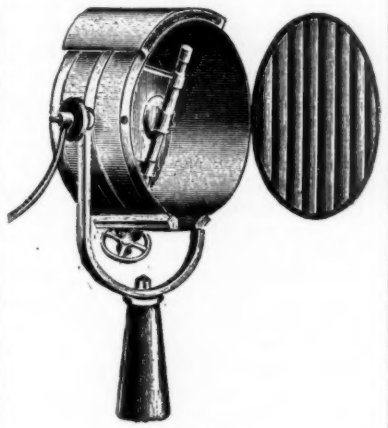


FIG. 2.

Fortunes in Patents.

The Government Commissioner of Patents estimates "that from six to seven-eighths of the entire manufacturing capital of the United States, or six hundred millions of dollars (£120,000,000 sterling), is directly or indirectly based upon patents." A calculation of the same kind in this country reveals a still more surprising result, the capital invested being enormous. It has been computed that Siemens' inventions have produced more than five millions sterling, and have indirectly benefited the poor of this country largely, by creating new industries, or by reviving flagging ones.

"There is," says an eminent authority, "scarcely an article of human convenience or necessity in the market to-day that has not been the subject of a patent in whole or in part. The sale of every such article yields its inventor a profit. If we purchase a box of paper collars, a portion of the price goes to the inventor; if we buy a sewing machine, the chances are that we pay a royalty to as many as a dozen or 15 inventors at once."

Lord Brougham often said that he would gladly have exchanged his honors and emoluments for the profits and renown of the inventor of the perambulator or sewing machine.

Howe, the originator of this invention, derived the princely fortune of £100,000 a year from it, and from their mechanical improvements the celebrated Wheeler and Wilson are reputed to have divided for many years an income of £200,000; while the author of the Singer sewing machine left at his decease nearly £3,000,000 sterling. "More money," says a well-known writer, "has been, and always can be, made out of patented inventions than by any other investment or occupation." The telephone, the planing machine, and the rubber patents, realized many millions, while the simple idea of heating the blast in iron smelting increased the wealth of the country by hundreds of millions. The patent for making the lower end of candles taper instead of parallel, so as to more easily fit the socket, made the present enormous business of a well-known firm of London chandlers. The "drive well" was an idea of Colonel Green, whose troops, during the war, were in want of water. He conceived the notion of driving a two-inch tube into the ground until water was reached, and then attaching a pump. This simple contrivance was patented, and the tens of thousands of farmers who have adopted it have been obliged to pay him a royalty, estimated at £600,000. A large fortune was realized by the inventor who patented the idea of making umbrellas out of alpaca instead of gingham, and the patentee of the improved "paragon frame" (Samuel Fox) lately left by will £170,000 out of the profits of his invention. The weaving, dyeing, lace and ribbon making trades originated and depend for their existence upon ingenious machinery, the result of an infinity of inventive efforts. Carpet-beating, from being an untold nuisance, has become a lucrative trade through the same inventive genius and mechanical contrivance. Even natural curiosity has been turned to account in the number of automatic boxes for the sale of goods of all kinds, and fabulous dividends have been paid by the public companies owning the patents. In fact, any one can be a successful inventor. In proof of this, the most profitable inventions are the improvements in simple devices, things of every-day use, that everybody wants, and which are in the power of everybody to invent. A lady derived a large income for inventing a moving belt for drying eggs, albumen, etc.—*London Invention.*

Electric Light Plant Wanted.

Bids will be received up to 12 M., September 11th, by the Board of Penitentiary Commissioners of W. T., at Walla Walla, to furnish and set up ready for use an electric light plant at the territorial penitentiary at Walla Walla, W. T. The plant to be of sufficient capacity to maintain not less than 480 incandescent lights of 16-candle power each, and the engine and boiler for same to be of not less than 50 horse-power; the dynamo to be compound, wound for maintaining automatically a constant pressure on the lamps. All bids to be accompanied by the plans and specifications according to which the bidder proposes to construct the plant. Each bidder will also furnish catalogue of lamps, with price of each, so the commissioners can select each lamp; all to be completed entire by November 1, 1888.

F. J. PARKER, President.
J. E. EDMISTON, Secretary.

—— The Brush-Swan Electric Light Company, Geneva, New York, have recently opened their new station, which is one of the most conveniently arranged stations in the country. Charles H. Avery, the energetic Superintendent of the Company, has succeeded in making the entire plant, including the lines, equal, if not superior, to any plant of its size. Four or five hundred incandescent lamps on the direct system, and a number of arc lamps have recently been added. Geneva is to be congratulated.

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EDITORIAL ANNOUNCEMENT

Address all communications and make all Express Money orders, P. O. orders and checks payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Timothy W. Sprague, Massachusetts Institute of Technology, is our representative at Boston, Mass.
Mr. C. C. Haskins, 118 La Salle Street, Chicago, Ill., represents the REVIEW in the West.

NEW YORK, AUG. 18, 1888.

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The convention of the Edison electric light men held at Nastasket Beach last week, was largely attended and a very successful meeting. A report of the proceedings appears elsewhere in this issue.

Week after next, the National Electric Light Association will convene in this city. We again urge upon all electric light and electric power men the importance of being present. It will amply repay you.

It would now seem, judging from article in the London *News* published in another column, as if our systems of electrical distribution were to be established in England and replace in a measure their system of isolated plants.

If electricity can restore sight to the blind, cause the rheumatic sufferer to throw away his crutches, and, above all, as reported elsewhere, restore life, it is evident that the wise physician is he who thoroughly acquaints himself with all the properties of this new agent.

The first public trial of long distance telephony in England will be made at the meeting of the British Association, to which exceptional interest attaches this year on this account. A public telephone has been established in Paris and Marseilles, but at present England is far behind France in respect to the telephone.

A report comes from Hartford that a young man named Ayers was "killed by a shock from an electric light wire" while on a pole, and in his fall struck another wire and the second shock, says the surgeon, "undoubtedly restored him to life." Here is a pointer that the advocates of electricity as a means of execution of criminals should consider.

BARKING AT THE MOON.

The first inhabitants of Arcadia, we learn from high authority, were wont to chase the sun, but whenever they reached the hill whereon he seemed to rest, they, to their amazement, beheld him at the same distance from them. Our esteemed friend, the editor of the Milwaukee *Sentinel*, would seem to have recently been engaged in a similar expedition against the moon, and the results of this venture, with comments thereon, as set forth in a recent editorial, are both interesting and novel; not, however, containing any evidence that he caught the moon, but rather that the moon caught him. This ridiculous conduct on the part of the moon in thus turning the tables on him, he very naturally resents, but we confess we cannot commend his attack upon it under cover of the electric light. Look at this!

"The elevation of glaring electric lights throughout a city, turning night into a very bad and wholly unnecessary imitation of day, is looked upon as an evidence of progress. It seems that Nature made a very grave mistake in instituting darkness, and the wits of men are engaged in efforts to correct Nature's blunder. The planets are too far off to afford any useful light, the stars are useless, and the moon is too irregular in its habits as a luminary. * * * A citizen of Atlanta writes to a local paper to complain that he has not had one night of absolute rest this summer because of the electric light, such is the effect on his nerves."

Far be it from our wish to deny that Nature instituted darkness; but then did not Nature institute moonlight to dispel it? Moonlight with its silvery beams, borrowing as it does, all the gladness it can from the invisible sun, and making the city's streets, and mountain, dale and mead to glow; a boon to the traveller, and a terror to the footpad and burglar. In almost the same breath our critic complains that darkness is necessary to our well-being, and then that the moon is irregular. By irregular we suppose he means that the moon does not remain stationary over Milwaukee all the time, but gives the balance of the world a show, which this carping critic would seem to object to. But surely, if the moon were regular, there would not be any of that darkness which he seems to think is such a boon; hence, his complaint will not lie; a characteristic, which, in electric light discussions, as in all others, we cannot too strongly commend. His evident preference for dark nights we cannot understand, not knowing his habits, but it is at least suspicious, and as to the citizen of Atlanta who has "not had one night of rest this summer," we know him. Alas! that we should recognize him through the thin veil of concealment he would throw about his identity. It is not electricity that so preys upon his nerves, but another and far more potent a fluid. Indeed he might just as well attribute to electricity his unintelligible speech, his feeble pulse, his robust breath, and the inclination of his legs to become tangled. The moon will never hurt him, and neither will electricity. We have our share of the moon, and must make up the long interval between its waxing and waning with some other kind of light. In the years agone, they used farthing dips, good in their way but weak, then came lamps, which were both weak and troublesome, next gas, which was poisonous, and now we have found in electricity a fair imitation of moonshine. Long live the moon and its nephew, electricity.

MAXIMS IN JOURNALISM.

In a recent address before the newspaper men of Wisconsin, Mr. Chas. A. Dana, the able and experienced editor of the New York *Sun*, announced the following maxims which we deem worthy of the widest circulation:

First—Get the news and get all the news and nothing but the news.

Second—Copy nothing from another publication without complete credit.

Third—Never print an interview without the knowledge and consent of the party interviewed.

Fourth—Never print a paid advertisement as news matter. Let every advertisement appear as an advertisement—no sailing under false colors.

Fifth—Never attack the weak or the defenceless, either by argument, by invective or by ridicule, unless there is some absolute public necessity for so doing.

Sixth—Fight for your opinions, but don't believe they contain the whole truth or the only truth.

Seventh—Support your party, if you have one, but do not think all the good men are in it and all the bad ones outside of it.

Eighth—Above all, know and believe that humanity is advancing and that there is progress in human life and human affairs, and that, as sure as God lives, the future will be greater and better than the present or the past.

EDITORIAL ENDORSEMENT BY THE NEW YORK "HERALD."

Mr. Dana has done a service to journalism by formulating a group of maxims, the result of a long and memorable career as a leader in a great profession. A maxim has value when it is the embodiment of experience. Journalism is an incomplete calling, and every year has a new lesson. In England we may date its beginning as a profession from the advent of the late Mr. Delane on the London *Times*, somewhere about 50 years ago. In America, as all the world knows, it began with the foundation of the *Herald* in 1835.

The modern journal began its new and high departure with its independence. By this we do not mean infallibility, for the journalist may err as well as any one else. No influence swayed its course but a desire to seek the public good. It recognized no political ecclesiastical business or social power and served alone the people. With this independence came courage, success, wealth, and the journal as the embodiment of popular desires and duties became strong and bold. What had been a vague or more or less successful business venture, or, perhaps, a series of light, crisp essays like Franklin's sayings of Poor Richard, was a profession with ethics of its own. From these ethics and the results of ever increasing experience, we have maxims as Mr. Dana laid down in his Wisconsin address, and with the wisdom of which we heartily concur.

The essential principle in a profession is its integrity. Mr. Dana cites an old *Herald* maxim always observed—namely, "Never print a paid advertisement as news matter. Let every advertisement appear as an advertisement. No sailing under false colors."

The violation of this rule is the most frequent as it is the most flagrant form of newspaper dishonesty. The *Herald* has dwelt upon instances of this in New York journalism, and has made exposures among the worst forms of blackmail. The journalist says to his reader: "I sell you a printed sheet. In one column you will read certain statements, items of news, narratives and opinions, all carefully gathered and told, and which you must accept as the honest outcome of industry and thought. In another column you will read printed notices, paid for advertisements, each telling its own story on its own responsibility." The reader, under such conditions, knows what he is doing. He buys his paper under this assurance, and it may be that his actions are governed by what he reads to his loss or gain.

This is a clear and honest bargain. The reader knows what he buys, what is news and what is an advertisement. For the journalist to accept money for a publication and conceal that fact is the same as uttering counterfeit money, receiving money under false pretenses, what the law should regard as a misdemeanor. If false pretense is criminal, then it is a crime. The reader is at the newspaper's mercy. If he believes what he reads, as the subscriber to a newspaper is apt to do, there is no knowing what misfortune he may invite—business trouble, ill health, loss of money and opportunity, infinite forms of annoyance and embarrassment.

This *Herald* maxim, which Mr. Dana printed in his address with his own emphatic indorsement, is the fundamental idea of honest journalism. An advertisement is an advertisement, the news is the news. Any other course, as Mr. Dana says, is sailing under false colors, an abomination and disgrace to journalism.

NEW BOOKS.

An Index to Engineering Periodicals. By F. E. GALLOUPE, M. E., published by ENGINEERING NEWS PUBLISHING CO.

This is a book which should have a place in the library of every investigator. The work is a most elaboratcly compiled index of the more important papers and articles contained in leading American and English periodicals during the last five years. The index is by subjects, alphabetically arranged, and makes available information now practically buried in the mass of engineering literature, on account of the great labor involved in searching the mazes of 150 different indexes. It is a most valuable book, and meets a very decided want. For sale at this office.

ELECTRIC CLUB NOTES.

Applications for membership are continually coming in.

The new and very attractively printed list of members and by-laws are now ready for members at the clerk's desk.

Marshall P. Wilder, the humorist, who has many friends in the Electric Club, came over in the "City of New York," and was greatly pleased over the reception he received down the bay. Some people had an idea, he remarked, that the reception was intended for another passenger on the ship, and he decided to let them think so, but he knew it was for Wilder as soon as he saw a representative of the Electric Club on the welcoming boat.

President H. C. Davis of the Electric Club returned last Sunday from a two months' visit abroad, and will be tendered a dinner by the members at the club house Thursday evening of this week (August 16) at 7 o'clock. The committee, Messrs. C. O. Baker, Jr., and W. L. Candee, have mailed notices to all the members, and although the uncertainty of addresses during the heated term may prevent some from getting their notices in time, a large turn-out is assured from the replies received by Tuesday.

The Electric Club was visited last week by Col. W. W. Johnson, of Baltimore; Hon. Hamilton Disston and Hon. Alonzo Shotwell, of Philadelphia, and several other out of town gentlemen attending the Blaine welcome. The three gentlemen named are enthusiastic friends of the statesman from Maine, and by their good humor and leading in the entertainment of songs and marching, captured the other delegations, and saved the long wait for the delayed ship from becoming monotonous and dull.

OUR CHICAGO LETTER.

(Special Correspondence.)

The people at Mansfield,-Ohio, have been worked-up quite recently on the subject of overhead wires. On the morning of the last day of July, a new five-story building was pretty effectually wiped out by fire, and something over half of $200,000 worth of merchandise destroyed. The telegraph, telephone and electric light wires so hindered the fire department, that the loss is far above what it would have been had the fire worshippers been free of the wire annoyance.

A mysterious affair in Chicago was that where a husband and wife named Heesch were found dead a few days ago. The former was found hanging from one of the inner doors of their house, and the latter lying upon the floor dead, with no indications of the manner of her exit. It is now believed that the woman was killed by an overdose of electricity, administered by the husband. A powerful magneto was found on the premises, and the fact that they were accustomed to using electricity as a curative power, strengthens the assumption. It is thought the husband accidentally killed his wife, and then, fearing the consequences, committed suicide.

Lightning and thunder have been the constant companions of the furious rain storms of the past few days, and Chicago has had her share of these demonstrations.

One evening in the fore part of the week, three children, aged respectively, seven, four and one years, out of curiosity ran to an open window to watch the storm. They had hardly reached the spot when a blinding flash stunned and prostrated the three. One was severely burned about the abdomen and lower limbs, a second was burned from the hips downward, while the third was burned about the face and chest. An open window is not a good location for a reserved seat in a thunder storm.

The king-bee storm of the season, however, struck Chicago and vicinity on Thursday, between five and six P. M., and made things quite lively, at that particular hour, for the street car people hailing from the North Side. The cars are usually expected to go through the tunnel on Lasalle street, dry shod. There may be a bottle or two in the smoker end of the grip, but otherwise the trip is a dry one.

There was, as usual, a large number of persons to go home about that time of day, and the cars were expected to serve as umbrellas. But the elements were on a tear, and the torrents which fell ran into the tunnel from both directions, for ten minutes, in such masses that the water came well up towards the seats. Between the flashing of lightning, which almost constantly lighted up the entrances and struggled with the electric lights for the mastery within, and the roar of the incoming torrent from either direction, and the splash of the struggling cars, the passengers were in no condition of mind for an afternoon nap.

The lightning played some curious pranks. A stretch of wooden sidewalk on Ohio street was struck, some 25 of it thrown up into the air and thrown across the street. Fortunately no one was using the walk at the time, or the demonstration might have been less amusing.

Many persons were bathing in the lake at the time, and there were vessels in sight in the offing, but fortunately these all escaped. One life only was lost, although several buildings were struck.

At the weather bureau, the clerk of the weather said, "It was the worst storm I ever saw, and it seemed to be at its worst just over this building."

Just before the storm the temperature suddenly fell 13 degrees. Sixty-seven one hundredths of an inch of water fell during the hour of the first flooding, and $\frac{75}{100}$ fell during the P. M. and evening.

The telephone girls took a back seat during the rumpus, and the telegraph operators got an occasional sputter in lieu of a letter.

The fire alarm lines were damaged to the extent of burning out four lines, one box, and an arrester at each of two street stations.

Marshall Butler, 17 years of age, who was down near the lake, took shelter under a tree which was struck, and was instantly killed.

One of the stables of the Stock Yards Company, at the corner of Halstead and Forty-third streets was struck, and an attempt was made to turn in an alarm. The lines and boxes did not work properly, and Paul Revere like, John Hugh, assistant superintendent at the yards, mounted a steed and sped away to give the alarm in time to save much of the property of the company. Several horses were lost, however, and the total damage is estimated $15,000.

While the "White Caps" are having things much their own way in Indiana, I have been led to believe there are designing men in Missouri. I have seen signs from that State which make me nervous. For instance, this mystery came by mail quite recently:

C. C. H.

Talking of signs, here's one on Twelfth street:

CHRISTIAN SCIENTIST.

ALL KINDS OF FATAL DISEASES CURED.

Kansas City. W. W. S.

I feel there must be some hidden mystery here. When a physician presents a bill for "curing your wife till she died," the meaning is plain; but the above is a beastly conundrum. C. C.H.

Chicago, Aug. 6, 1888.

OUR BOSTON LETTER.

(Special Correspondence.)

All indications point to coming year as one of unusual activity in the line of electrical business. Manufacturers and dealers alike express themselves as satisfied with the outlook. In railroading circles, the talk of the week has been, of course, the contract of the West End Street Railway Company with the Sprague Company to equip two of its important suburban lines with electrically propelled cars. The coming conventions in New York are already attracting much attention, and Boston's delegations will probably be not behind its predecessors at previous gatherings, in either size or quality.

The Eco magneto watchman's clock seems to be meeting with the success predicted for it. The sales in this vicinity are large, and the New York agents of the company are more than keeping their end up. Manager White of the company has been away on a business trip the past week.

The Sawyer-Man Company are making many installations these sultry days, among which may be mentioned one at Providence of 60 lights for George H. Thurston, a 75 light plant to better supply the Wellesley College students with artificial illumination, 150 lights for the North and Judd Manufacturing Company, of New Britain, Ct., and a large 400 light plant for the Forestdale Manufacturing Company, of Providence. During the last six weeks, the sales of the Sawyer-Man Company to supply central stations and plants of other systems have amounted to over 20,000 lamps.

Mr. George W. Davenport, of the T.-H. International Company, has been rusticating and getting in trim for the coming conventions, among the pines of Maine. Mr. Davenport is expected back at his desk to-day.

Both Mr. Sprague and Mr. Harding have been in the city the past week in consultation with Messrs. Sawyer and Blake, the local agents of the Sprague Company, in reference to the West End street railway contract. The work will be pushed to the utmost, and before snow flies Boston ought to be able to judge of the merits of an electric road within its own borders.

The new local agency of the C. & C. Motor Company at 19 Pearl street, in charge of Mr. G. E. Claflin, a recent technology graduate, is doing a good business, and justifying the expectations of its friends.

NEW ELECTRIC LIGHT STATION.

The new electric light station which has just been completed by the Malden Electric Light Company was inspected by the city government and prominent electric experts, upon invitation from the Malden Electric Light Company. The station is situated off Centre street, and is built of brick with stone trimmings, at a cost of about $20,000. The new station has four engines of 80 horse-power each, and seven machines with a capacity for 150 arc lights and 600 incandescent. The officers of the company are: John A. Bartlett, of Lynn, president; H. A. Royce, treasurer; C. W. Royce, secretary; and A. E. Bliss, superintendent. "S."

Boston, August 13, 1888.

OUR ST. LOUIS LETTER.

(Special Correspondence.)

I noticed lately that the Westinghouse project to establish an illuminating station in lower New York, has brought out of their holes the usual number of "newspaper electricians" for and against the "deadly alternating current."

Then the vivisectionist has his day, and the poor dog ends his, in the interest of science. The people, in the meantime, look on and wonder what all the fuss is about, and ask themselves what will it all amount to when presented to the honorable Board of Electrical Control, who acknowledge that they know nothing at all about the subject on which they are supposed to pass judgment. To the untutored, wild westerner, it seems that somebody is trying to make somebody else a bigger fool than he is himself, and desires to pose as the Only Electrician. The simile fits both parties and either would benefit their respective companies by keeping the valves on their balloons closed until called upon by their open-mouthed admirers to make a descent from their high altitude and be stripped of the eagle-wings that they have been decorated with, and assume the plain, every-day color of the honest old owl that has gained fame by keeping a close mouth, and a good living by pretending to know more than anybody else, in a *quiet* way.

It would be a kindness to shut off the would-be electricians that are always before the public discussing the cross section of Prof. Deepthought's new armature, or the utility of the ohm in connection with the amount of copper necessary to operate a threshing machine by electricity, situated on a farm 40 miles from a water power. If the same individuals would make a cross section of their brain, and utilize it in trying to make a good working machine and lamp that would always call for the payment of the contract when completed, they would commence to do some good.

Business, from an electrical standpoint, is fairly good for the dog days, and bids fair to show up an active season.

The United States Company is about to increase the custom house and post office plant fromt 600 to 1,500 lamps.

The Edison Company's electrician, Mr. J. F. Porter, is busy installing a 450-light plant at the Mermod & Jaccard jewelry establishment. The Westinghouse Company illuminate the spectacle of "The Last Days of Pompeii" with 1,500 sixteen candle-power lamps, operating the machinery at the power house of the Western Cable & Railroad Company, at least five miles distant from the grounds. It apparently gives great satisfaction, and at the conclusion of the summer season, the company will endeavor to introduce the light in the numerous fine private residences in the immediate neighborhood of the power house. Messrs. Thomson & Jones, proprietors of the Pine Bluff Water Works, have contracted with the Thomson-Houston Company for an arc plant of 100 lamps, and an alternating incandescent plant of 1,000 lamps. The Western Electric Construction Company, of Kansas City, is engaged on the installation. Mr. M. E. Bates, manager of the Western Electric Construction Company, was in the city last week, and thinks the business outlook very good.

But in Kansas all depends on the corn crop. No corn, no electric light plants. I notice, in a recent issue of a western journal, that Prof. Somebody or another in Indianapolis had photographed the moon by the use of the arc light. If he could photograph, by the same means, the frontispieces of some of the members of Kansas town municipal councils who say that it is a good light—only they won't—and then hang a coat in some convenient back room, taking care that the pockets are examined by an interested party before they cast their vote, then our photographic friend would be of service in this sinful old world. As we have all been sweltering in the shade of 100°, I am sure you will excuse brevity. W. C. B.

St. Louis, Mo., Aug. 10.

Interview with Mr. H. C. Davis.

Mr. H. C. Davis, president of the Sawyer-Man Electric Company, arrived from England on the "Umbria" last Sunday, after an absence of over two months. The trip was made in relation to personal interests, but Mr. Davis found time to look into electrical matters, particularly electric lighting.

A REVIEWITE asked him how he found electric lighting in England.

"They are very far behind the United States in this respect," he replied; "owing probably to three causes. First, the difficulty of securing the necessary rights; second, the heavy losses met with in the early speculations in this means of illumination, and, third, the extremely low price of gas, caused by cheap coal. In some places gas is as low as 18 pence a thousand. I think, eventually, however, the electric light and its advantages over gas will be so well appreciated that the difference in cost will not affect its introduction."

"How did the electric light work in England appear to you?" was asked.

"In the matter of appliances and general installations they are far behind us. This work is much better done in our country. As far as I heard, the practical work we are doing is fully appreciated by English electricians."

Mr. Davis stated he had enjoyed his trip, was not sea-sick, and had the "Umbria" not met with an accident near the end of her journey, she would have beaten the record. He found great interest taken in our politics by the English press and people, the expressed wish of all of them being that the free trade party should win.

—— Warren, R. I., is asking to have her streets lighted by electricity.

—— The Brush-Westinghouse electric light plant in New Orleans was burned July 16th; loss, $100,000.

—— The stock of the Cherryfield, Me., Electric Light Company, of which Mr. Wm. M. Nash is president, is nearly all subscribed for. The company has a capital stock of $7,000. Some of the saw mills will have the light.

—— The Eastport, Me., Electric Light Co., has been organized at Eastport, with capital stock, $25,000; paid in $75; par value shares, $25. S. D. Leavitt, of Eastport, is president; N. B. Nutt, of Eastport, treasurer. The business to be prosecuted is to furnish light, heat and gower.

—— A new electric light service is to be established in Dover, Great Falls, Rochester, and East Rochester, N. H., the station for these four places to be located at Great Falls. The Holmes Company is now making the plans for the new station and everything connected with it, building, wheels, shafting, dynamos, etc., and the work will be done under their direction.

—— At the meeting of the council at Ogdensburg, N. Y., Tuesday evening, a contract was made with Mr. John H. Findlay, to furnish fifty electric lamps, for the term of five years, provided the tax payers vote each year the necessary tax for continuing the light. The lamps are to be lighted at dusk and kept burning till one o'clock in the morning, during the months of May, June, July, August, September and October; and the rest of the year till midnight. The price is to be $72 per light per year for 20 nights per month.

—— The arrangements for lighting Port Deposit, Maryland, by electricity are progressing. A number of citizens will have the light put in their dwellings and places of business. The subject of lighting the Methodist Episcopal Church by the same means is being agitated. At present the edifice is lighted by gas, manufactured by an apparatus belonging to the church, which cost considerable money, and there is some doubt as to the propriety of incurring the expense necessary to make the change.

TELEGRAPHIC

.... Mr. D. I. Carson, general manager of the Southern Bell Telephone Company, New York, has accepted the secretaryship of the Telautograph Company.

.... The July output of the Lake Superior copper mines is as follows: Calumet and Hecla, 2,756½ tons; Quincy, 350¾ tons; Atlantic, 221¼ tons; Franklin, 190¾ tons.

.... A quicker police wanted—Says the Boston *Commercial Bulletin*: "An electric company advertises 'lightning arresters.' Had the city been provided with one last Wednesday, the garroter on the Common would not have escaped."

... Millions of small brown moths, known as "leaf-rollers," visited Reading, Pa., one evening last week, and died by the million beneath the electric arc lights. They were said to have descended in clouds, and at times greatly obscured the light.

.... A lightning rod man, one Geo. A. Wiggin, of Maine, was indicted for selling lightning rods without a license in the State of New Hampshire. Mr. Wiggin demurred and the Judge sustained him, and he can now sell all the lightning rods he can find patrons for.

.... The capital stock of the Telautograph Company is to be not less than $500,000 nor more than $15,000.000, with headquarters at Richmond, Va. It is reported thal Prof. Gray received a large sum of money for the invention, and has sold it entire to the Richmond Company.

.... In addition to enjoying the distinction of being the only refiners of crude platinum in the United States, Messrs. Baker & Co., of Newark, N. J., handle large quantities of aluminium, both in sheet and wire. They report an increasing demand for this metal for electrical purposes.

.... A novel electric railway is undergoing construction in a suburb of St. Paul, Minn. The railroad is an elevated structure, and the cars are hung below it close to the street level. They hang from sets of wheels taking their power from the tracks, which are charged with electricity. A speed of from eight to ten miles an hour is claimed for the cars.

.... A Western Union party, consisting of General Manager Clowrey, Supt. Tubbs, Supt. Wright, Supt. McMichael, Supt. Corbett and Electrician Cleveland Hendricks Summers were in the upper peninsular, Michigan, arranging for great increase of telegraph mileage, which will bring the north country into much closer connection with the rest of the world.

.... H. A. Stares, engineer representing the Western Electric Company of New York, has been engaged to lay a new telegraph cable between Astoria, Oregon, and Fort Canby, in place of the one broken two years ago by a vessel dragging her anchor. It has been found impossible to fish up the old cable, as it seems to be covered by the sand. The new cable will be laid at once.

.... A rumor is being circulated to the effect that Jay Gould proposes to sell his Western Union interests to a syndicate of leading financiers, including John Mackay. This syndicate will be composed of Drexel, Morgan & Co., Brown Bros. & Co., Kidder, Peabody & Co., and their English connections, together with the Vanderbilts, who formerly held the controlling interest in the Western Union and sold the same to Gould. John Mackay's advent into the pool will unite the cable companies, and a restoration of rates would follow. In other words, it would be a gigantic trust in telegraph matters.

The First Telegraph Instrument.

Mr. William Walter Phelps has introduced into Congress a bill to purchase from Stephen Vail, of Morristown, N. J., the original telegraphic instrument, or recording receiver, invented by his father, Alfred Vail, and used upon the first telegraphic line ever constructed—that between Washington and Baltimore—and to transmit the first message ever sent: "What hath God Wrought?" The purchase of this instrument is strongly recommended by the officers of the Smithsonian Institution. The price is $10,000.

Change in Cable Rates.

On and after the first day of September next, the charge for the transmission of cablegrams, via, "Direct Cable" between New York City and Great Britain or Ireland, France and Germany will be twenty-five cents per word.

Special arrangements can be made at the general offices of the company for the transmission of press messages.

The Board of Control and the Western Union Co.

Mr. A. S. Brown, who is in charge of the subway work of the Western Union, does not agree with the Board of Electrical Control, when in its babyish manner it tried to say something mean about Mayor Hewitt and hit the telegraph company a rap at the same time in the following:

How different would have been the situation in this city to-day if the Mayor had proceeded as did the Mayor of another large city in this country under similar circumstances, when he drove the Western Union Telegraph Company beyond the limits of the city, and forced it to establish its only terminus in that city in a stock yard until it had placed its conductors underground.

"I cannot understand," Mr. Brown says, "what the Commissioners had in view when they wrote that. I think this intimation that the Western Union Company has placed itself in any such attitude as that should be corrected. There is no truth in the statement and no foundation for it. No such thing ever occured anywhere. We never had any such difficulty in any city or town in the United States, or out of them either. We have put our wires underground without compulsion in certain parts of certain cities, and we are not antagonistic to the Subway Commissioners at all. We are perfectly willing to put our wires underground for short distances where it is practicable to do so at any expense that would not be prohibitory. For long distances the systems of telegraphy in use in this country—the multiplex and Wheatstone—will not work well underground. What do I call long distances? Well, two or three miles would make a great difference.

"The only thing I can recall that the Commissioners may have had in mind was a little difficulty that the Mutual Union Telegraph Company had in Chicago in 1882, long before its consolidation with this company. The Mayor of Chicago cut one of the Mutual's lines, but immediately repaired it, either the same day or the next, on the company's promise to change the line from that street to another, which was the only question at issue. The line's location was changed according to promise, and the Mutual Company did not close a single office in Chicago on account of the merely temporary trouble.

"The Western Union had, three or four months ago, a little trouble at Fort Wayne, Ind., not about putting its wires underground, however. The company had a line of poles through a street the grade of which was being changed by the authorities. Several of the poles were undermined, and one fell. When the Western Union Company undertook to reset the pole it was restrained by an injunction obtained by a private citizen, and as the company could not have the injunction removed, it simply closed its office in town and conducted all its business at the depot, some distance from the centre of the city, and that state of affairs exists yet. The only demand made there was that we should move our poles into a back street. As for removing dead wires we always do so promptly as soon as our attention is called to them by the Subway Board."

A Boston Man on the Burton Electric Heater.

TO THE EDITOR OF ELECTRICAL REVIEW:

On page 2 of the ELECTRICAL REVIEW, August 11th, I notice "The Burton Electric Heater" has used my name, and I desire at once to take broad and good-natured exception to the following, in the sense it is used: "He finally returned the models to Richmond and abandoned the attempt."

Having the warmest personal attachment for Dr. W. Leigh Burton among my many valued personal friends in the city of Richmond, the impression must not go out that I ever abandoned either him or his invention. The facts are simply (and probably the Doctor has lost sight of them), when the several models were put in my care I was favored by another, an old-time personal friend, Mr. Chas. Whittier, of the Whittier Machine Company, with the loan of a one-light Brush arc dynamo, and experimented with it all one summer—as an hour could be afforded—designing and having another application of it made, and a model 14 to 16 inches square was built on my plans and fully tested on the above dynamo. The development of electric applications was not in 1882 what it is to-day. The whole matter was shown to several men in a quiet way. It promised too much. I would not gamble, in the formation of a company, and so for some months little was done.

Meantime, Dr. Burton was kept fully posted, as my letter books show, and I cooked articles of food, aside from some other results. When the Doctor wrote we had proposed to reissue his patents, and so I sent all his and my own models to him at Richmond. Upon my next visit he told me he had interested some one, whose name I forget, and in that way I "abandoned" the matter.

I never lost faith in the heating by the electric current. Dr. Burton simply invented the radiators 15 years before a dynamo was made with which to heat up the radiator. The matter will be a success under some one's hands.

I may add in justice to both of us, that no word of misunderstanding has ever occurred between us, and I simply don't abandon anything I attempt.

Dr. Burton is one of my personal friends, and I truly and sincerely wish him all the benefits possible, for I believe his invention has merit, and will succeed, practically.

Boston, Aug. 11th. THOS. PRAY, JR.

Lightning Cured His Lameness.

ATLANTA, GA., Aug. 3.—Until a few days ago Jacob Miller, who lives in Cobb County, had not walked in seven years on account of the contraction of the muscles of his leg. During a recent storm, while sitting under a tree, a stroke of lightning shattered the top of the trunk of the tree. Miller says he felt the current of electricity pass through his body, and he thought death was upon him. In attempting to get his crutch he found that his lame leg was almost straight, and he has walked without assistance ever since.

In these days of electrical appliances and apparatus it is manifestly impossible to keep a watch out of the danger line, for the field is one of considerable extent. It is after a watch has become magnetized that a jeweler is called upon for a remedy. The cure is effected only after the harm is done. Prevention is better than cure, and it is certainly wiser to keep the "watch blight" from getting in than to devise ways of getting it out. Mr. C. A. Paillard, of Geneva, Switzerland, conceived the idea of using a non-magnetizable material for the parts of the watch that are thus constantly causing trouble, and after 14 years of experimenting, arrived at a satisfactory substitute for the metals ordinarily used for the balances and springs This alloy of palladium is used for the compensation balance and hair-spring in the non-magnetic watch only. This watch compares favorably with other watches in its finish, and is no higher in price than those of similar quality without these improvements.

Telegraph Operators in Persia.

It was a wild, barbarous country, about the Turko-Persian border, inhabited chiefly by nomad Koords, and I missed even the occasional welcome company of the Turkish telegraph line. Its disappearance seemed like casting off the last strand of western civilization. At that time I hardly expected to see another telegraph line until I should reach Japan, my intention being to reach the Pacific through Turkestan and China.

Suddenly one day, when nearing Tabreez, I saw away off on the desert a sight that made me blink and rub my eyes to make sure that it was not a mere optical illusion I was looking at. The deserts of Persia are famous for producing bogus objects—mirages of lakes and waving palms, of lovely castles and similar fascinating scenes; but this time it was none of these. Miles away to the north, seemingly suspended in mid-air, was a league-long row of telegraph poles, straight as a die, even as the pickets of a garden fence.

As I drew nearer, the line assumed a more definite form. Its marvellous symmetry, I then discovered, was not the enchantment of distance, but a solid reality in English iron, with the name of the contracting firm stamped on the poles, every pole tapering from a circumference of 20 inches at the bottom to six or eight at the top, and across the dead level wastes of the Persian plains set up as evenly and perpendicularly as they might have been in Hyde Park. It is worth noting, perhaps, by the way, that the English always take particular pains to have everything of this kind very superior in the East; it is a perpetual source of wonder and admiration to the natives, a standing advertisement of England's wealth, power and ability to the multitude who have no other way of learning.

From Tabreez I was able to follow this infallible guide into Teheran. Often I could see it stretching ahead of me mile after mile, the poles so even that they seemed not to vary an inch, and disappearing in the heavens at the farther end by the curious legerdemain of the desert. The æolian music of its triple wires as the desert breezes played through them, and the messages flashed past from India to England, from England to India—how companionable it was, that bit of civilization in a barbarous country, only those who have been similarly placed know.

During my stay in Terehan I became quite intimately acquainted with the staff, not only in the capital, but throughout all Persia. There are many curious and interesting phases of life connected with the telegraph service in such a country as Persia that are unknown here. Its alignment and its working staff represent a narrow streak of western civilization through all that part of Asia. Men 2,000 miles apart, who never saw each other in their lives, are, nevertheless, well acquainted. The lone Englishman at the little anterior control station at Dabeed is kept informed from day to day by his chums at Terehan of the doings of the European colony there.

Teheran, Ispahan and Shiraz are the three favorite stations in Persia. Operators are rewarded for good service by being stationed at these points, or disciplined for misconduct by being assigned to some lonely control station, where the only society is a few ragged villagers, and their stations a mere mud hovel. Dabeed, about midway between Teheran and Bushire, is considered the worst station in Persia. The extremes of heat and cold in Daveed are intense. From many degrees below zero in winter and raging storms like blizzards, it gets so hot in summer that the operator often sits at his instrument up to his chin in a tub of water. None of the cooling appliances that make life tolerable in India are available here.

The Ingliz telegraph-jee is quite an important personage in Persia. Outside Teheran and Bushire he is the sole representative of Europe. He is a sahib, whose salary often exceeds the income of the Persian prince or governor of the town. He has several servants, and keeps the showiest riding horses in the town, vieing in the matter of horseflesh with the local prince, with whom he is always

on very good terms. He and the prince invite each other to dinner: not a day passes but the prince comes and smokes a kalian or two in the telegraph thana, and in the evening they sit beside the steaming samovar and smoke and drink tea. The prince sends his friend, the telegraph-jee, presents of fruit, or a pheasant now and then, and when the line inspector comes along and leaves with the Englishman a few bottles of choice Cruiskeen Lawn the prince knows he will not be overlooked.

The mollars and seyuds and khans and leading merchants—these too are all friendly as a general thing, to the Feringhi. He is the one relief from the monotony of daily life to them, a speck of human interest upon which to center the Oriental curiosity.

It is often a remarkable change for the young Englishman. From an unambitious berth in England, wages a pound a week, he finds himself in a month or two hobnobbing on equal terms with Persian princes, with twice as much money to jingle as the prince, and riding the finest horse in town. In addition to a large salary, inducements are held out to him to qualify himself for preferment. A sum equal to three months' salary is paid him for passing an examination in Persian. Five hundred pounds are offered as an inducement to qualify for services in India. For all these advantages about the only sacrifice he has to make is of a social nature.

Food is cheap and plentiful, and in the larger stations almost everything can be found in the bazaars. Some of the men marry and settle down in the service; they obtain wives from England, or marry the maid servants at the legations in Teheran. One or two have married American women; but by so doing the "telegraph sahib" loses caste, much as a man does out west by marrying a squaw. He loses caste in the estimation of his comrades, the Persians, and also with the Americans themselves at heart, although they consider the capture of a sahib very advantageous.

Everything is now so thoroughly equipped and organized that the telegraph service runs smoothly and efficiently; but this was far from being the case at first. The difficulties were a long way from being overcome when the line was put through. For some years it was almost impossible to keep communication open between Teheran and Bushire. Here for nearly a thousand miles it follows along the greatest caravan route in Persia. The charvadars and camel men regarded the long lengths of nice strong wire strung all along their route almost in the light of a special dispensation of Allah, sent to their favored country so that they might obtain all the material they wanted from time to time to mend their ramshackle pack saddles, chains and harness, without paying out any money.

All summer long thousands of camels and pack mules are constantly employed along this route, and the caravan people used to render the line well nigh worthless. Whenever anything broke that could be mended with wire, the charvadar would simply shinny up a telegraph pole and help himself. In a day or two, perhaps, something else would fall to pieces; but it mattered little to the charvadar, for an unlimited quantity of good English telegraph wire was always to be had for the trouble of climbing a pole.

Next to the charvadars the wandering tribes were the worst depredators. The nomads of Persia are much given to embellishing their charms of person by means of thick wire bracelets. Copper or silver wire is their preference, but they have no objection to bracelets of baser metal, especially if they can obtain them without pay. To stretch a telegraph wire through country was about the same thing as placing a pot of jam where it can be easily reached by a boy. Nomads who had caught on went strutting about the country wearing a wealth of telegraph wire bracelets that made the eyes of their less lucky tribes bulge with astonishment.

Finding that they could be obtained for nothing by merely climbing up the Ingliz poles and hacking off the wire, the popularity of the new style bracelets spread far and wide among the Elianites, Susmanis, and Bactiaris. These unsophisticated children of the desert, for a long time, outdid even the caravan men. Ambitious young nomads thought they saw in the unlimited quantities of telegraph wire an opportunity to largely increase their wealth, and they began to carry the bracelets into the more remote regions as articles of commerce.

All this the English Government stood patiently, hoping that time and the employment of numerous native linemen would eventually put a stop to the depredations. The caravan people, however, finding that they escaped punishment, grew more and more enterprising and aggressive. They were not slow to discover in the thing they found so profitable sources of amusement to boot. They took to shooting at the insulators for wagers and clipping the wires with bullets for sport.

Another form of recreation was to make a mark up near the thin end of the cast-iron poles, and stand off so many paces and shoot at it. They used to gamble on the number of shots it would take to crack the pole, and bring the upper part, cross-trees, wires, and insulators down to the ground. This was, of course, rare fun for the Persians. But for those who had to bring iron poles from England, and pack them on camels hundreds of miles over the deserts, it was not quite so funny.

The English finally had to appeal to the Shah to protect the line. "Very good," said the king of kings, blandly, "it shall be stopped." Orders were sent out to cut off the hands of people who were found wearing telegraph wire bracelets. This had the desired effect, and to-day the telegraph wires are as safe in Persia as in any country.—*Thomas Stevens.*

Electrical Discoveries and Horology.

The numerous discoveries in electrical science, or, rather, the innumerable applications of electricity to the modern requirements of man, have added new problems for our horologists to solve. It has been known, almost from the existence of watches, that their delicate mechanism was highly susceptible to magnetic inflences, and manufacturers of marine chronometers many years ago exercised their ingenuity to prevent their instruments from being influenced by the magnet. Our attention has been called to an article printed in *The Revue Chronometrique*, wherein is described the means adopted by Messrs. Arnold and Dent to protect chronometers from the magnetic influence. Their experiments were published as long ago as 1833, and the report of them will be found of interest. Others followed in their footsteps, and various devices were conceived to protect marine chronometers from the disastrous effects which magnetism sometimes exerted upon them. While these horologists are entitled to every credit for the ingenuity displayed in overcoming the difficulties presented to them, they had no conception whatever of the fact that at a later day the almost universal adaptation of electricity to ordinary business purposes would render it necessary to surround the ordinary watch one carries in his pocket with safeguards against adverse influences, as it was in their day to protect the marine chronometer from the adverse action of the magnet, or of magnetism, however developed.

The introduction of electric lights, requiring strong and powerful currents for their operation, and the immensely powerful dynamos necessary for the generation of these currents, has brought a very large class of persons within the immediate influence of the electric current, and, as all men in these days carry watches, the derangement of pocket timepieces had become very common. The problem presented to the horologists of the present day was to discover some means of rendering the watches of ordinary use non-susceptible to the influence of powerful and very common currents of electricity. Instead of being called upon to overcome a difficulty found in a comparatively few special cases, as in the marine chronometers, they had to make the every-day watch of the average individual non-magnetic. Unless this could be done, the great watchmaking industry must necessarily be greatly injured, for the sale of watches is dependent upon their trustworthiness. Whenever a great emergency confronts the human race, the man to grasp it has always been found; so in this emergency the horologists have proved themselves worthy the trust reposed in them for the protection of the great interests under their charge. Not only one, but half a dozen scientists came promptly forward with their different devices for protecting watches from electrical influences, and to-day watches are made that defy the strongest currents of electricity that are used in any industry. Every manufacturer of watches has some device of this kind, and non-magnetic watches are to be found in the stock of every dealer. The men who devised them are as much original inventors as though no one had previously experimented in a similar direction years ago with marine chronometers; the conditions of the emergency that was upon them were so entirely different, and the means used to overcome the difficulty are so varied, that they are entitled to all the credit that attaches to an original invention. While we do not wish to detract in the least from the well-earned and worthily-worn honors of their predecessors, we do desire that the horologists of to-day shall have full credit for their ability to meet successfully any difficulty or emergency that may be suddenly sprung upon them. It is not too much to say for them that in this instance they rescued a great and important industry from serious peril with which it was threatened.—*The Horological Review.*

Telephone Improvements in Baltimore.

The handsome new building for the Chesapeake and Potomac Telephone Company Exchange, corner St. Paul street and Bank lane, is nearly completed says the Baltimore *Sun*. The structure is five stories high, with basement, and is 26½ feet front on St. Paul street with a depth of 100 feet on Bank lane. It is built of pressed brick, with granite and brownstone trimmings. When completed the building will contain all the latest improvements and be thoroughly fire-proof. The Exchange will occupy the entire fifth floor. The room will be fitted with the latest apparatus for telephoning, and the present system will be greatly improved. The business office of the Exchange will be opened in the new building in the early fall. Nearly a year will be consumed, however, in placing the wires. The company has 2,300 subscribers and 1,600 lines, which they propose to run partly underground, provided permission will be granted by the mayor and city council. Philip Walsh & Sons are the contractors and Mr. George Frederick the architect of the building, which will cost $125,000.

Mayor Latrobe, speaking of the proposal to place the telephone wires underground, said: "With the new building will doubtless come the next great improvement—putting the telephone wires underground. While this is most desirable, and would be a public benefit in many respects, it should not be forgotten that it has become a necessity for the telephone company, in order to give its constantly increasing number of customers proper facilities. To put the wires underground requires digging up the streets. This is a public inconvenience at all times. No city has suffered from it oftener than Baltimore. We have gone through the annoyance of five or six opposition gas companies. I think the telephone company should pay to the city an annual sum for the use of its streets. It may be said that no other city has charged anything for this franchise, but then no other city charges the passenger railway companies anything, while Baltimore derives an annual revenue from this source of nearly $150,000. The State Legislature has given away the franchise of our streets to the gas companies and to the telegraph posts. The city should not be induced by the desirability of underground telegraph, telephone and electric light wires to give away the valuable franchise of putting conduits underground. This is rapidly being recognized as a necessity by these companies, and they can make it very profitable. The city should get a revenue therefrom, and thus somewhat relieve our already overburdened taxpayers."

Telephonic News

*** At Carbondale last week, a telephone wire became crossed with the main wire of the electric road. It was "good-bye" telephone.

*** A telephone line is contemplated to run between Cambridge, Quaker City and Barnesville, Ohio, three thriving little towns along the line of the B. & O. R. R.

*** The People's Telephone Line, erected between Millbridge and Cherryfield, Me., in 1885, in opposition to the Millbridge and Cherryfield Telegraph, is discontinued, and the poles have been taken down and moved to another place.

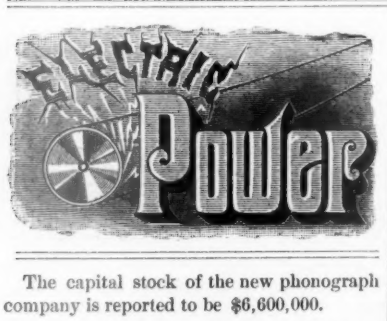
*** Bell telephone earnings for June are said to show an increase of 60 per cent. over June, 1887, while the gain for July is placed at over $100,000 in comparison with the same month last year. Earnings are now stated to be at the rate of 28 per cent. per annum on Bell stock.

*** A despatch from Dayton, Ohio, dated August 6th, says: "By crossing wires the full power from the electric street railway dynamos was turned into the Telephone Exchange to-day, setting it on fire and destroying 600 telephones throughout the city, completely shutting off all telephone business." Messenger boys must now be in demand in the city of Dayton.

*** Erie Telephone shows net earnings of $59,092 for three months ending June 30: An increase of $10,580; construction has been $9,869, leaving balance of $49,223; 204 subscribers have been added. A quarterly dividend of ¾ of one per cent. has been declared payable by check mailed to stockholders August 13th, that are of record at noon, August 4th. The stock books will be closed from noon, August 4th, and opened August 13th.

*** It is very funny how the telephone gets tangled up. A gentleman has an office in the Boston capitol, and the other day his call-bell rang. He answered "Hello!" and this is what the fellow wanted at the other end: "Won't you please give me an outside stateroom, to-night, on the boat?" he asked. He was told his mistake. Half an hour afterwards, he was called again, and this time a female voice asked: "Please send me two dozen eggs, five pounds of roast beef, two pounds of chops, a peck of potatoes, and, if you have some very good onions, send me around a couple of quarts, please!" The lady was politely informed that she was not talking with a butcher or grocer shop, but with an office in the capitol. These mistakes will occur when the wires get crossed, and every time those wires cross, a great many good people get cross at the telephone answering sample calls like the above.

*** Superintendent Hanson, the manager of the Quincy, Mass., telephone exchange, takes exceptions to the reports recently published about him, says the Boston *Globe*. He says there has been trouble with the telephones in that section for three or four weeks, but he is not to blame, as the company is rebuilding its lines. "I am," said Mr. Hanson, "giving my personal attention to the refitting and rebuilding of the exchange in that town, and when the work is completed I am confident that there will be no further trouble. In regard to the complaints which it was stated I did not take any notice of, I wish to say that every complaint received was fully and thoroughly investigated by myself. I have been in charge of that exchange for three and a half years, and during that time there have been nearly 100 telephones added to the service. That fact shows whether or not I have attended to business."



The capital stock of the new phonograph company is reported to be $6,600,000.

The Hartford and Wethersfield Horse Railroad company have adopted the electric system of running cars, and will put it in operation as soon as possible.

President McNamara, of the Albany Railway Company, is investigating the question of electric railways with the view to adopting electricity on his Albany line.

The New Haven Electric Light Company has petitioned the Board of Aldermen for the right to construct and maintain an underground conduit in certain streets of that city. Referred to the Board of Public Works.

The signers of the petition, headed by W. F. Sherman, requesting authority to lay tracks and run cars by horse, steam or electric power, to Middlesex Village and Chelmsford, mean business, and have secured the right of way in Chelmsford. Electric power will be used on the new route.

The Thomson-Houston Electric Co. is trying to secure such franchises in Lake View, Ill., as will enable them to push their system of light and power. A conference between the representatives of the company and the committee on street lighting and the Mayor, was held last week. An ordinance relating to the matter will probably be reported to the council very soon.

The electric cars at Ansonia, Conn., were not run after nine o'clock, Saturday night of the great electric storm. They ran up to that hour without experiencing any difficulty, but it was thought best to cease operations for the night. It was impossible to use telephones about town with any degree of satisfaction during the storm, and telegraph wires snapped incessantly.

Messrs. Ganz & Co., of Buda-Pesth, have recently received several large orders for electric lighting plant from Australia to supply central stations at Melbourne, Huntershill (near Melbourne), and Huntershill (near Sydney), the first mentioned station having a capacity of 2,700 horse-power, to be doubled later on. In addition to this orders have been received for central station plant from Montevideo and Valencia, and for a transmission of power plant to be set up at Rives, France.

Sight Restored by Lightning.

Referring to the paragraph that appeared in some of the daily papers last week of the restoration to sight through a flash of lightning at Wolverhampton of a collier who some time ago lost his sight through an accident, we think, says the London *Electrical Review*, that this is a matter which should occupy the attention of those medical gentlemen who are interested in the application of electricity for curative purposes. Some time back Dr. Lawrence was trying some very interesting experiments with regard to reducing the thickening of the albumen of the eye by passing light currents of electricity through the ball to reduce it to fluid. He tried his experiment by heating in water the white of an egg, and after having caused it to set re-liquified it with great success by passing currents through it. The medical profession might now institute a series of experiments upon the influence of electric shocks in cases of partial or total blindness, and we will undertake to say that the results would make the study well worth pursuing. We believe that Mr. Spagnoletti, the genial past-president of the Society of Telegraph Engineers and Electricians, could relate many instances of remarkable cures of various maladies by a more or less prolonged application of the electric current, obtained, of course, from a powerful galvanic source, and not from a useless "electropathic" belt such as we described some six months ago.

The C. and C. Motors in Demand.

The following is a list of users of the C. and C. motor in New York city, and gives a good idea of the extensive adoption of electric power by our citizens:

T. Mundorff, 1173 Broadway; R. W. Zundell & Co., 2 Fulton st.; Norman & Dunker, 90 John st.; Blancard & Co., 36 John st.; J. Peiser, 171 Broadway; Northwestern Mutual Life Insurance Co., 13 Park Row; Chas. Pfizer, 81 Maiden Lane; Mather & Wentworth, 16 Maiden Lane, N. Y. Stock Exchange, 13 Wall st.; Ira Perego, 128 Fulton st.; J. F. Scott & Co., 4 Maiden Lane; J. N. CeBallos & Co., 80 Wall st.; G. B. Rolfe, 42 John st.; Shannon, Miller & Crane, 46 Maiden Lane; Lanman & Kemp, 70 William st.; R. Kolb, 164 Pearl st.; H. W. Johns Mfg. Co., 87 Maiden Lane; W. H. Bennett, 91 Wall st.; McDougall & Sprague, 97 Wall st.; W. P. Wight & Co., 74 Broadway; Blake Bros., 5 Nassau st.; *Mail and Express*, 23 Park Row; J. V. Robins, 54 John st.; Selchow & Righter, 41 John st.; B. F. Coleman, 13 Park Row; F. & H. Lemmerman, 2 Fulton st.; I. Abrahams, 42 Fulton st.; Crass & Beguelin, 21 Maiden Lane; C. Fanara, 9 Cortlandt st.; O. M. Fanard, 3 Maiden Lane; N. Y. Belting and Packing Co., 13 Park Row; C. A. Cheever, 13 Park Row; The Okonite Co., 13 Park Row; A. Lorsch & Co., 37 Maiden Lane; Henry & Frank, 2 Cortlandt st.; P. Newman, 2 Cortlandt st.; Mark Meyer, 100 Fulton st.; DeLacy & Co., 33 Park Row; Prince & Whitley, 66 Broadway; Potter-Lovell Co., 10 Wall st.; International Hotel, 15 Park Row; Merrit's Rest, 139 Broadway; Harris Bros., 176 Broadway; J. B. Kleinert, 76 Spring st.; Hallenberg & Lowenstein, 484 Broadway; A. H. Ward & Co., 54 Mercer st.; Huber & Seefried, 354 Sixth avenue; American Express Co., 65 Broadway; H. A. Bang, 1214 Broadway; C. Gosford, 19 New st.; H. & J. Blenderman, 100 West st.; H. & J. Blenderman, 193 Washington st.; *Evening Post* Job Office, 206 Broadway; E. Lanters, 535 Broadway; Jas. Duffy, 74 Beaver st.; H. B. Christensen, 26 Church st.; DeLacy & Co., 5 Barclay st.; Equitable Life Assurance Co., 120 Broadway; L. Bonet, 927 Broadway; R. H. Hutchinson, 250 Bowery; St. Paul's Chapel, Broadway & Fulton st.; Dawsonamel Co., 15 East 17th st.; Goodwin Strong & Co., 713 Broadway; W. H. Rodier, 208 Fulton st.; John Bostleman, 102 West st.; Niagara Fire Insurance Co., 135 Broadway; H. Peterson, 74 Park Place; Conservatory of Music, 21 East 14th st.; Oppenheim & Isaac, 66 Grand st.; Dorlan & Shaffer, 13 Fulton Market; Stakl Bros. & Sevine, 91 Grand st.; E. Ferris & Co., 185 Washington st.; Lowe & Co., 210 Fulton st.; Long Island Machine Emb. Co., 384 Canal st.; Princess of Wales Co., 458 Broadway; Brush Electric Illuminating Co., 208 Elizabeth st.; Calumet Club, 29th st. & Fifth avenue; ELECTRICAL REVIEW, 13 Park Row; Electric Club, 17 East 22d st.; Fahnestock & Co., 2 Wall st.; Koster & Bial, 24th st. & Sixth avenue; Lotos Club, 21st st. & Fifth avenue; Howard & Morse, 45 Fulton st.; J. O'Neil, 22d st. & Sixth avenue; U. S. Illuminating Co., 208 Fulton st.; U. S. Illuminating Co., 59 Liberty st.; Van Liew & DeForrest, 617 West 52d st.; Vocalion Organ Co., 24 East 23d st.; U. S. Supply Co., 51 John st.; Union Special Sewing Machine Co., 47 Leonard st.; F. B. Starr, 206 Fifth avenue; J. Stock, 204 Fulton st.; G. H. Pell, 20 West 43d st.; Park, Davis & Co., 60 Maiden Lane; Metropolitan Life Insurance Co., Church st. & Park Place; A. Mander, 91 Nassau st.; A. Levy & Bro., 614 Broadway; R. Loeb, 55 Walker st.; E. Hurley, 424 West 57th st.; Franklin Photo-Electric Co., 305 Pearl st.; Domestic Sewing Machine Co., 14th st. & Broadway; J. H. Clark, 927 Broadway; Crichton & Co., 225 Fulton st.; Consolidated Pat. Shirt Co., 712 Broadway; L. S. Cox & Co., 72 Walker st.; G. A. Castor & Co., Lafayette Place; A. Benjamin & Co., 106 Bleecker st.; American Exchange National Bank, 116 Broadway; L. Achtelstatter, 143 Fulton st.; Benedict Bros., 171 Broadway. Total number motors, 300; installations, 115; one-eighth horse-power, 260; one-fourth horse-power, 8; one-half horse-power, 19; one horse-power, 6; two horse-power, 2; three horse-power, 1; five horse-power, 2.

Peculiar Electrical Phenomena.

Some very singular electrical phenomena, says the *English Mechanic*, were observed on two very dry days at a printing office in Mayence, when the establishment seemed to be converted into a huge electrical battery. Electric sparks several centimeters long could be drawn with the fingers from all parts of the printing machinery, just as may be done from a charged electric machine. The action of the sparks became so pronounced that the layers-on and takers-off (who, it should be remarked, in German printing offices are mostly young woman) refused to work, as burning sparks were emitted every time the machines were touched with the hands. The electrical phenomena were most striking in the machines used for lithographic printing. A strong paper made of cellulose was being printed at the time, and the takers-off observed a slight crackling as the sheets, when adhered pretty closely to the oil-cloth covering of the cylinder, were being withdrawn. This crackling was finally developed into a loud explosion, accompanied by beautiful flashes from ten to twelve centimeters (from four inches to five inches) in length. The discharges are stated to have been more effective the more quickly the sheets loaded with electricity were withdrawn. A small circular saw mounted about four inches from an iron column discharged at intervals of from 20 to 30 seconds, when driven, powerful electric sparks, accompanied by loud explosions, upon the column. These phenomena were observed for hours, and continued for two days, when the printing office became free from electricity, and has remained so since.

The following explanation is given of the occurrence: The outer walls of the building in which the printing machinery is placed are separated from the surrounding soil by a thick layer of asphalte, serving to keep the moisture arising from the soil from penetrating the walls. In the present case the asphalte at the same time served to isolate the electricity generated within. The floors of the several machine rooms are also laid thick in asphalte, and the machinery is fixed direct to this flooring, so that it is likewise perfectly isolated. There are only a few iron columns having direct connection with the earth. On the morning of the day on which the startling phenomenon described was first observed, all the machine belts had been greased with a mixture consisting of resin and linseed oil, serving to increase the friction between the belts and the pulleys. As soon as the machinery was set in motion, each individual pulley was converted into an electric machine on a large scale, negative electricity being formed on the belt covered with resin, and positive electricity on the iron pulley. The stored electricity, of course, was immediately given off whenever one of the machines, which for the time being were changed into accumulators or secondary batteries, was "tapped."

Manufacturing Notes.

The Eddy Electric Manufacturing Company, makers of automatic electric motors and electrical test instruments, which located at Windsor, Conn., last spring, in the factory formerly occupied by the Spencer Arms Company, is a welcome enterprise, and their business is increasing every day. They have a good motor.

Messrs. Cassidy & Son, 127–131 Mercer street, the well-known manufacturers of artistic gas fixtures, are now manufacturing a line of electric and combination fixtures that will be appreciated by the electric lighting public. This firm has recently taken the following contracts, among numerous others, for combination fixtures: Emigrant Industrial Savings Bank, New York; Arion Society, New York; Detroit Opera House; Bijou Opera House, Pittsburgh; Warner Opera House, Kansas City; Kansas Club, and Kansas City Board of Trade. Messrs. Cassidy & Son give their factory their personal supervision, and the wants of their customers receive the best of attention.

During the past week, the Julien Electric Company have installed on the steam yacht, "Stranger," belonging to Mr. Geo. S. Scott, an accumulator plant of 50 Julien cells. They are particularly convenient in a case of this sort, as they enable lights to be kept burning through the evening and night after the boat has come to anchor; and also make it possible to have a double illumination in the case of lighting the exterior of the boat. They are also installing a very complete plant in the house of Mr. T. H. Porter, Stamford, Conn., consisting of a Baldwin gas engine, small dynamo and storage battery. In addition to the lighting of the entire house, the current from the batteries will be used for running small motors and probably for passenger elevator.

Won by the Sun Electric Company.

In the United States Circuit Court at Boston, August 7th, Judge Colt rendered his decision in the suit of the Westinghouse Electric Co. *vs.* The Sun Electric Co. *et al.* This suit was brought to enjoin the defendants from infringing letters patent No. 351,589, granted October 26, 1886, to George Westinghouse, Jr., assignee of Lucien Gaulard and John D. Gibbs, for improvements in methods and apparatus for the distribution and conversion of electric energy.

There are five claims in the patent, the first being for the art or method and the remaining four claims for the apparatus. One of the questions in the case related to the proper interpretation of the patent in view of plaintiff's disclaimer. As originally drawn, the patent was intended to cover all forms of converters which transferred electric energy. The patent office refused to grant so broad a patent as was applied for and instructed the applicants that in order to avoid an interference, they must conform the arrangement of converters to the series system, that being the arrangement shown in an article on engineering of March 2, 1883, which the applicants declared contained a description of their invention. A disclaimer was accordingly inserted.

The court now holds that it is too late for the plaintiff to say that the disclaimer means nothing, that by the disclaimer Gaulard and Gibbs were expressly limited to the series system, and therefore that the defendants, who use the multiple arc system, do not infringe the patent. The court accordingly decided, without entering upon other defences raised, that the bill should be dismissed.

The Fort Wayne Jenney Electric Light Company was interested with the Sun Company in defending this suit.

Personal.

Mr. D. W. Baker, of Newark, accompanied by his wife, returned from Alaska last week, traveling through Yellowstone Park, and over the great lakes, the water ride being for a distance of 1,200 miles. Mr. Baker, who is a prominent business man of Newark, was greatly benefited by his visit to the far off country of Alaska.

Col. M. W. Goodyear, as aide to Grand Marshal Jackson, covered himself with glory and his horse with foam the night of the Blaine parade. No one made a handsomer figure on horseback than the gallant Colonel in his regimentals. His enthusiasm for Mr. Blaine is well known among his electrical friends.

Several electrical gentlemen are living on yachts this year. Mr. J. P. McQuaide and Mr. J. J. Carty have a sailing vessel of excellent dimensions, and placed it at the disposal of several of their friends who desired to welcome Mr. Blaine. Mr. McQuaide was known as "Commander Mac" and Mr. Carty as coxswain. The guests, Mr. Baker of Newark and Mr. Porter of Philadelphia, dined aboard the vessel in true yachting style, and depleted the larder so that the sails had to be set for shore too soon to greet the distinguished man from Maine.

Mr. Chas. Flesch, general manager of the Australian Light and Power Company, a large organization with a capital of $2,000,000, was a New York visitor last week. His company is using the Zipernowski-Deri system, and Mr. Flesch is investigating the incandescent lamp question in this country.

Mr. J. C. Chamberlain, chairman of the Club House Electrical Committee, is an active member of the Marine and Field Club of Bath, L. I., and makes that Club his home during the hot summer months.

—— The Messrs. Shippey Bros., Limited, have been appointed English agents of the Waterhouse Electric Company, of Hartford, Conn.

—— At annual meeting of the Amesbury, Mass., electric light company, the following officers were elected:—President, Robert Drummond; superintendent and treasurer, Charles Ross; directors, Robert Drummond, Charles Goss, D. J. Marston, Edmund Morrill, D. J. Folger, A. W. Bartlett, E. S. Lane. It was decided to put in a new boiler and engine.

The New Short Stroke "Straight Line" Engine.

The cut on this page represents the 9"x12" new short stroke engine built by the Straight Line Engine Company, which is meeting with well-deserved success. The frame is cast in one piece, with the cylinder, steam chest cylinder, jacket and other parts. While this proves an expensive way, it has the merit of remaining perfectly true, and the form being such as to place the metal in the best possible position to resist the strains.

No wear can take place at the main journals; and provision is made for facing the valve seats without interfering with the valve adjustment. The cross-head is the slipper-guide pattern, the lower guide being adjustable in the vertical direction in a novel way. It rests upon, and is bolted to, two inclined planes, being perfectly adjustable. The cross-head pin is made fast in connecting rod by a binding screw, which grips the end of the rod, the body of the screw entering a groove in the pin prevents it from moving endwise.

The valve controls the distribution of steam as is done by the common D-valve, but having a variable travel controlled by the governor, it varies the amount of steam admitted as the work imposed on the engine varies. The valve is a rectangular plate, quite thin, and with five openings through it. The valve works within an opening formed by the valve seat, and a pressure plate and two distance pieces placed above and below it. The plate has recesses in it opposite the posts in the valve seat, and the distance pieces are made a trifle thicker than the valve. The heater resting against the distance pieces are made a trifle thicker than the valve, the plate resting against the distance pieces relieves the valve of all pressure. By the recesses in the pressure plate and the small openings through the valve, double posts are opened both for steam admission and exhaust. The valve being thin, and the distance pieces exposed to the steam same as the valve, no trouble is experienced by having the valve bind by expansion.

Over-pressure, occasioned by water in the cylinder, is relieved as by a slide valve lifting from its seat, occasioning no broken cross-heads or valve rods, and while the valve is liable to wear down by riding on the lower distance piece, it does not open a leak over the top, as is the case with piston valves.

The piston is made long and light, secured to the rod by two taper seats, a parallel thread and shrink fit. The packing is four eccentric cast iron rings. The long, light piston gives ample wearing surface, and render the packing against steam leakage less difficult.

The piston rods are of steel ground, and polished, and have reduced ends that the babbitt bushings which form the steam-tight joints will overrun at the ends.

The connecting rod is a steel casting, and the crank boxes are hammered babbitt metal, bored and scraped to fit.

The steel crank pin and shafts forced into the large bosses of the two wheels form a solid structure dividing the strain equally between the bearings, and gives an opportunity to balance the reciprocating parts properly, furnishes a support for the governor and relieves the main bearings of a good part of the thrust of the piston. The wearing surfaces of the crank pin and shafts are ground on dead centers to perfect truth, and the parallelisms of the shafts and crank are absolutely perfect. The wearing surface of the crank and main journals are made exactly of the same length as the wearing surface in the babbitt-lined boxes, and as the main shafts and crank have one-quarter inch play through the boxes, grooves are turned in the shafts and cranks so that the boxes can overrun.

The governor consists of a single ball linked to the eccentric and a spring, and so located and weighted as to counterbalance the eccentric and its attachment, and controls the speed of the engine. When the speed reaches the point where the centrifugal force of the governor ball overcomes the resistance of the spring, it flies out and moves the eccentric nearer the shaft, shortens the travel of the valve and reduces the steam admitted to the engine.

Messrs. Williams and Potter, 2 West 14th street, New York City, are the general agents and have installed a large number; among them we mention: Auverne Hotel, Auverne by Sea, near Rockaway Beach; Mr. Whitelaw Reid's mansion, Hon. Levi P. Morton, Mr. C. P. Huntington, Mr. George M. Pullman and Mr. Archibald Rogers.

—— The corporation committee have traded with the Skowhegan (Me.) Electric Light Co., for 31 lights for the coming year at $48 per light. This gives six additional lights over last year.

Semi-Annual Meeting of the Edison Association of Illuminating Companies.

Nantasket Beach, the Coney Island of Boston, was the place selected for the eighth semi-annual session of the Association of the Edison Illuminating Companies, last week.

The convention was called to order by John I. Beggs, president of the Association, on Wednesday morning, August 8, and the sessions continued until the afternoon of the day following.

The following is a complete list of delegates attending the sessions:

From the Edison Electric Light Co., New York City—E. H. Johnson, president, J. H. Vail, general superintendent, W. J. Jenks, manager, municipal department, L. Stieringer. Charles Wirt, H. T. Edgar. From the Edison Illuminating Co., New York City—John I. Beggs, vice-president and general manager. From the Edison Illuminating Co., Boston, Mass.—C. I. Edgar, general superintendent, Hubbard Breed, treasurer, W. A. Hill, W. H. Atkins, E. L. Caldwell, H. H. Niles. C. J. Field, chief engineer, Edison United Mfg. Co., New York City; Chr. Wustenfeld, general manager, Edison Ill. Co., Elgin, Ills.; A. M. Renshaw, general manager, Edison Electric Ill. Co., Washington, D. C.; R. M. Jones, general manager, Laramie Electric, Gas Light & Fuel Co., Laramie, Wyo. Ter.; Magnus Pflaum, director, McKeesport Electric Light Co., McKeesport, Pa.; H. Ward Leonard, electrician, Leonard & Izard, Chicago, Ill.; A. L. Smith, president, Edison Electric Ill. Co., Appleton, Wis.; F. G. Kurz, superintendent, C. P. Gilbert, general manager, John R. Markle, director, Edison Electric Ill. Co., Detroit, Mich.; J. W. Schroeder, Edison Co., Roselle, N. J.; Wilson S. Howell, treasurer, Association of Edison Ill. Cos.; Albert F. Dow, president, J. H. R. Ward, electrician, Edison Electric Ill. Co., Fall River, Mass.; Thomas P. Merritt, president, F. N Boyer, secretary, Edison Electric Ill. Co., Reading, Pa.; C. R. Price, treasurer, Edison Electric Ill. Co., New Bedford, Mass.; F. R. Upton, treasurer, F. E. Jackson, assistant electrician, B. F. Card, agent, Edison Lamp Co., Harrison, N. J.; Geo. H. Kirchwey, president, H. L. Browning, director, Edison Electric Ill. Co., Albany, N. Y.; E. H. Brooks, manager, Edison Electric Ill. Co., Lebanon, Pa.; W. J. Paine, manager, N. E. Wiring & Construction Co.; E. B. Greene, Supt. Edison Electric Ill. Co., Altoona, Pa.; Will C. Turner, secretary and general manager, F. E. Drake, treasurer, Edison Electric Ill. Co., Columbus, O.; Samuel N. Trump, president, J. A. Lighthipe, electrician, F. L. Gilpin, secretary, Wilmington City Electric Co., Wilmington, Del.; S. B. Paine, agent, Edison Co., Boston, Mass.; W. H. Francis; A. O. Shepardson, general manager, Connecticut Electric Co., Waterbury, Ct.; W. L. Garrison, treasurer, Geo. W. Palmer, Jr., superintendent, Edison Electric Ill. Co., Brockton, Mass.; G. W. Russell, director, Wm. M. Brock, supt., Edison Electric Ill. Co., Lawrence, Mass.; J. B. G. Roberts, general manager, Edison Electric Ill Co., Cumberland, Md.; Maurice Hoopes, supt., Edison Electric Ill. Co., West Chester, Pa.; H. McL. Harding, general agent, Sprague Electric Railway & Motor Co., New York City; H. K. McKay, supt., Edison Electric Ill. Co., Birmingham, Ala.; J. E. Giles, supt., Edison Electric Ill. Co., Hazleton, Pa.; H. L. Brewster, secretary, Edison Electric Ill. Co., Rochester, N. Y.; J. S. O'Brien, supt., Edison Electric Ill. Co., Wilkesbarre, Pa.

Among the papers read and addresses presented were the following:

By Mr. Turner, of Columbus, instructive load diagrams giving comparisons of variations of lighting.

By Mr. Harding, of the Sprague Co., a summary of applications of motive power as supplied by Edison stations.

By W. J. Jenks, at the Wednesday evening session, a paper on lightning protection. This essay entered into the conditions and the possible prevention of damage to central station apparatus, as well as telephone and telegraph devices from atmospheric electricity, and was illustrated by about 50 stereopticon diagrams, including some magnificent recent photographs of lightning flashes. The illustrative work was done by Mr. A. D. Handy, of Boston. Mr. Harding took occasion to show a number of slides illustrative of motor work.

By Mr. Jackson, a careful and thorough paper on the new high economy lamp, detailing its entire success in realizing all that Mr. Edison has claimed for it.

By Mr. Upton, a statement of the Lamp Company's position with reference to the rapid growth of the business.

By Mr. Wirt and Mr. Leonard, able and elaborate papers on the question of feeders, feeder equalizers and three-wire system distribution and regulation. Both these papers were very exhaustive, and gratifying in their conclusions. They were followed by a discussion in which Mr. Leonard and Mr. Field prominently participated as to the comparative cost of the alternating and three-wire systems, as applied in several ways.

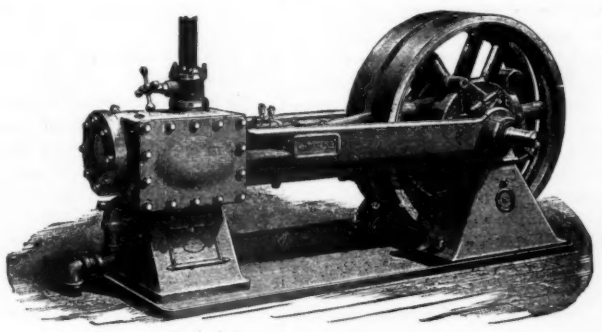
By Mr. Johnson, a statement of the standing of the Edison patent suits.

By Mr. Jenks, reports on the progress of the Municipal system of street lighting and the work of the Standardizing Bureau the past six months.

The annual election of officers resulted in the choice of—President, John I Beggs; Vice-President, C. P. Gilbert; Secretary, J. H. Vail; Treasurer, Wilson S. Howell; Executive Committee, A. L. Smith, F. R. Upton, C. L. Edgar, T. P. Merritt, R. M. Jones.

The executive committee reported that they had selected Kansas City for the next meeting, February 12, 1889.

Arrangements were made for the presentation of several papers of importance, and it was desired that the feature of an evening session for stereopticon illustration of subjects of special interest be perpetuated.



NEW SHORT STROKE "STRAIGHT-LINE" ENGINE.

—— The Bar Harbor Illuminating Co. is now burning a thousand incandescent lamps and about 20 arc lights. This is just about half of their capacity, which will be taxed to the utmost before the season is over.

—— The coroner's jury in the case of Frederick Witte, of this city, who died from the effects of an electric shock, render a verdict, censuring the U. S. Illuminating Company for having their lamps in a position that makes them dangerous to the public, and for not having their lamps and wires insulated. It also recommends that a corporation ordinance be passed compelling all electric light companies to insulate their lamps and wires, and also to insert a clause in their contracts with patrons, warning the latter not to touch the lamps or wires.

ELECTRIC LIGHT NEWS

—— The electric light plant at Newburgh, N. Y., has been sold to a New York company for $62,500.

—— At Colfax, W. T., the Colfax Electric Light Company will establish a plant at once. J. H. Perkins is president.

—— It is probable that an electric light plant will be established at Carroll, Iowa. H. W. Macomber of that city is interested.

—— Little Mamie Henderson, of New York, was run over and killed by an ice cart. The ice cart should be put underground.

—— The electric light plant in Haywards, California, was in running order July 28th, and the town's people celebrated the occasion by a band and procession.

—— Justice Patterson at Jefferson Market has adjourned, until October 2, the examination in the suit of the Board of Electrical Control against the U. S. Illuminating Company.

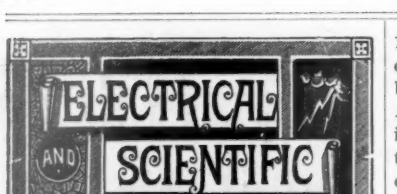
—— The proprietors of the Edison machine works fully appreciate the excellent service rendered by the Scotia fire department, at the recent fire at the works, and recently Mr. Insull sent the company's check for $100 to the Scotia firemen. This was acknowledged with much gratitude by James Collins, chief of the department.

—— The scheme of the Edison Electric Light Company to put their wires underground will be of interest as the first positive movement in that direction. The new company, if its schemes prove practicable, will also give Minneapolis a system of electric railways, for Mr. Lowry will experiment with the power to be furnished by the company on a street car line, and if it is practicable, he will introduce it on the motor line. Minneapolis would then be far in advance of other cities in its transit facilities.—*Minneapolis Tribune.*

—— At Ware, Mass., the electric light company expects to have its plant completed in about three weeks. Two arc lamps of 1,200 candle-power each are being put up on Church street, which will make about 35 arc lights on the streets. The company has ordered another 50-light dynamo from the Thomson-Houston Company of Boston, which it expects this week. The cost of the plant thus far has been about $16,000, and it is estimated that the entire cost will be $18,000. The company already has enough business to warrant a dividend at 10 per cent.

—— The Oakland Gas, Light and Heat Company are having quite an amount of trouble. The cause of the trouble is the large 200 horse-power boiler, which was recently purchased for the works. Thursday evening, shortly after the engines had been started, an accident to what is known as the "priming" of the boiler occurred. The water boiled over and ran down the pipes into the cylinders, instantly wrecking the engines. The lights upon the circuits also went out at the same instant. The damage will probably be covered by $5,000.

—— The Sullivan Harbor Land Company is advertising for proposals for an electric light system for its property in Maine. Both arc and incandescent lamps will be required, and it is proposed to utilize the tidal currents, which run for four hours either way on each tide through a narrow gorge between Fall's Point, Sullivan and Hancock Neck, within 1,500 feet of the village street. Its tide waters fill an immense arm of the sea, which runs up for three or four miles behind the village, and thousands of horse-power go to waste which it is now proposed to use, and by means of dynamos, run by motor wheels and auxiliary storage batteries, light not only Sullivan Harbor, but Hancock Point, Mount Desert Ferry and Sorrento, at one-third the cost of coal.



Electricity in the Reduction of Low Grade Ores.

The Utah Mining and Reduction Company, whose works are located at Bingham, ten miles south of Salt Lake City, are using the new "Meech process" in the reduction of their low grade and rebellious ores with success.

The ore is passed through a crusher and rolls, crushed to 40-mesh fine, thence into a disintegrating machine, four tons at a time, through a valve, with sufficient water and chemicals to treat the sulphur and refractory elements. Steam is then admitted to a pressure of 100 pounds per square inch, and, at the same time, the mullers are revolved at about 30 revolutions per minute, generating electricity in such volume as to greatly assist in the decomposition of the ore.

This is continued for three hours. The ore is reduced to an impalpable powder, many times finer than is possible by other methods, and is thorougly decomposed and desulphurized.

The water absorbs the chemicals, every atom of gold is made bright, and in condition for amalgamation. The pulp is now discharged into the amalgamator below, a revolving machine seven feet long and five feet in diameter, in which are copper plates placed lengthwise, and, by hydrostatic pressure, quicksilver is thoroughly pressed through the ore, by a "settler" of peculiar shape, having an electric copper wire broom to assist in gathering the fine amalgam before the tailings are discharged.

The cost of the treatment is from two to three dollars per ton, and, as the gold ores treated run from $12 to $20 per ton, it leaves a handsome margin for the owners.

The ore veins are large, and thousands of tons, or enough to supply the mill for the next 100 years, are already in sight.

By this process about 90 per cent. of the gold is saved.

The works occupy about nine acres of land on the banks of the Jordan river, and consists of two main buildings, 32x64 and 24x34, one two-story boarding house, one blacksmith shop, two 35 horse-power engines, one crusher, one roll, and other necessary appurtenances, are connected with the mines by the Denver and Rio Grande and Western Railway, and demonstrate in a practical manner the immense sums that can be realized from the treatment of low grade and refractory ore dumps, that have heretofore been considered absolutely worthless.

The Volta Prize and the Inventions of M. Gramme.

The French Chamber and Senate will shortly award the Volta prize of 50,000fr. for the best application of the voltaic battery, says *La Revue Internationale de l'Electricité*, to recall here the circumstances which originated the founding of this interesting prize. On the 19th Brumaire, year X., the First Consul was present at a meeting of the Institute, and heard Volta read a paper on the "Electric Battery." The outcome of this was the founding of a prize, which was open to the *savants* of all countries for the best application of this branch of physical science. Electricity seemed to the First Consul to merit special attention, and he doubtless foresaw that it would become in the future a fruitful source of discovery. On the 26th Prairial of the same year the First Consul published the conditions and fixed the prize at 60,000 francs. The first competition opened on the 10th Messidor. We must then go on to the 23d February, 1852, before we find any notice of the second competition. From this date the value of the prize was reduced to 50,000 francs, and competitions took place more frequently, the dates being 18th May, 1858; 18th April, 1866; 29th November, 1871. These competitions have always borne excellent fruit, the names of Faraday, Ampère, Ruhmkorff, and Graham-Bell being connected therewith. The last competition was opened on the 11th June, 1882, and closed on the 31st July, 1887. A special commission, sitting at the Ministère de l'Instruction Publique, was entrusted with making the award. The members of the commission decided by a majority of votes to award the Volta prize to M. Gramme, "for the improvements made by him in the construction of dynamo-electric machines." The improvement consists in having made a continuous-current machine, which was the starting point of that marvellous development of electrical industries which we are now witnessing. Yet in 1860 M. Gramme was a working carpenter employed by M. Ruhmkorff to put finishing touches to the woodwork of electro static machines. He soon became fascinated by the world of magic into which he had been suddenly introduced. He hardly knew how to read or write, but this did not stop him; he wished to know, and did know. His resources were of the most modest character. His library consisted of two books, a French dictionary and a work on physics; his laboratory was equally rudimentary, containing only a sheet of gutta percha, two magnets, and a few pounds of copper. In 1868, eight years later, he made his first continuous-current machine; but the impossibility of sufficiently insulating the adjacent wires did not allow him to take full advantage of his discovery. In 1869 he advanced a step, and made a new machine with a 10 kilogramme magnet and an armature wound with 1 millimeter wire. In 1871 M. Gramme devised for M. M. Christophle a machine running at 300 revolutions a minute, and able to deposit 600 grammes of silver per hour. A little later he built another machine for the factory of M. Whohwill, of Hamburg, which gave a current of 3,000 amperes at eight volts, and was able to deposit 800 kilogrammes of refined copper in 24 hours. In these days batteries are completely discarded for electro-metallurgical purposes, and the industrial applications of electricity have multiplied in every country. A vast array of inventors have followed in M. Gramme's steps. The Commission has awarded the prize, in short, to a hard-working, modest man, who has explored the secrets of nature, and who has known how to apply them in the best and most useful way. Electricity owes much to M. Gramme. Thanks to him, it plays an important part in modern times, and will end, we are convinced, by ousting steam from its present position of supremacy.

Remedying the Trouble.

Workmen in the employ of the Naumkeag street railway company put in a new frog at the turnout at the Washington street terminus of the Willows branch of the road, this morning. Yesterday, new connections were established in some places where the old ones were supposed to be defective, and it is said that the new connections obviated a great deal of annoyance which had been previously caused at the telephone exchange and at the police station. At the latter place, there was no trouble whatever excepting with the drop connected with Box 43, which fell when the car started. At the telephone exchange some of the annunciators fell, but the number was nothing compared to what it was upon the preceding days. The railroad company is to sink a plate to establish ground connection at the same depth as that of the telephone company, and when this has been accomplished, no further trouble is expected.

Another car has been fitted with electrical appliances, making four now in good running order.—*Salem, Mass., News.*

—— The Danvers electric light committee held a final meeting Tuesday evening and voted to put in the Brush system, and work will begin at once. There are to be 66 arc lights, and no incandescent, as at first proposed. The expense of putting in the plant will be $15,000, and the estimated cost of maintenance the first year $2,000. It is expected that the lights will be in operation in about three months.

Influence of the Chemical Energy of Electrolytes Upon the Minimum Point and Change of Potential of a Voltaic Couple in Water.

BY DR. G. GORE, F.R.S.

By means of a zinc platinum voltaic couple in distilled water, with its electro-motive force balanced by that of a suitable thermo-electric pile (*Proc.* Birm. Phil. Soc., Vol. IV., p. 130), the effect of several groups of chemical substances upon the potential of the couple was examined. Measurements were made of the electro-motive forces of a series of strengths of solution of each substance, and the results are given in a series of tables.

The minimum proportions of substance required to change the potential of the couple in water were as follows:

Potassic iodate..bet. 1 in	433 &	494
" bromate..bet. 1 in	344 &	384
" chlorate..bet. 1 in	221 &	258
Potassic iodide..bet. 1 in	15,500 &	17,222
" bromide..bet. 1 in	66,428 &	67,391
" chloride..bet. 1 in	695,067 &	704,540
Iodine .....bet. 1 in	3,100,000 &	3,521,970
Bromine.....bet. 1 in	77,500,000 &	84,545,000
Chlorine.....bet. 1 in	1,264,000,000 &	1,300,000,000

On comparing these numbers we find that the proportion of substance required to upset the voltaic balance was largest with the oxygen salts, intermediate with the haloid ones, and least with the free elementary halogens. It was smaller the greater the degree of chemical energy of the substance; thus it was about 400 times less with chlorine than with iodine. And it was smaller the greater the degree of freedom to exert that energy; thus it was about 5,416,000 times less with free chlorine than with potassic chlorate, or 1,570,000 times less than with the combined chlorine of the chlorate, and about 185 times smaller than with potassic chloride, or 88 times less than with the combined chlorine of that salt.

The order or curve of variation of potential by uniform increase of strength of the solution was different with each substance, and was apparently characteristic of the body in each case. A great number of such representative curves might be obtained with a zinc platinum or other voltaic couple in different electrolytes.

Electric Lighting in London.

Whitehall avenue has been selected as the site for a very important installation of the electric light, which, now that the purchase clause of the legislation of 1882 has been amended by an act that has just received the royal assent, seems likely to begin in real earnest the illumination of the metropolis. The sphere of this installation—the actual area covered by it—is not a very extensive one. The works have been planted in the midst of a number of large buildings—one or two of the great hotels, the fine block of residential chambers called Whitehall court, the Charing-cross Turkish Baths, and so on; and to these their operations will be chiefly confined. Nevertheless, the undertaking is on an extensive scale, says the London *Daily News*, as may be gathered from the fact that Whitehall Court alone will require 3,850 lamps for its complete illumination. The installation is indeed on a scale sufficiently extensive to warrant the confident expectation that the work of lighting the surrounding buildings from the one center will not only prove commercially satisfactory to those undertaking it, but can be done more cheaply than the proprietors of buildings can supply themselves by their own plant. It is computed that they will get the light at a lower rate, and will of course get the advantage of cellarage otherwise occupied by engines and dynamos, while they will be relieved of all the trouble attending their working.

The new works, which are to be ready for starting the light in October, are being constructed entirely under the roadway in Whitehall avenue, and will be of an especially complete and efficient character. The ten vast floors of Whitehall court will have no artificial light but that of electricity, and the importance of avoiding even ever so brief a failure is obvious. The engines and dynamos that are just about to be placed in position will be geared together without the intervention of driving bands, and in other ways are exceedingly compact and reliable. Moreover, provision has been made for a large storage of electricity by means of accumulators as a reserve, and for use at times when only so small a number of lights are required as would render it inexpedient to keep engines going. The use of accumulators involves a loss of electricity, but as only a small part of the entire current generated will be thus stored, this loss will be more than compensated for by the saving of engine power. It is, however, a special feature of this installation that it shall not only supply light to the buildings all around, but shall undertake the supply of electric power for many purposes for which gas and other engines are now employed. In America electric motors for all sorts of mechanical purposes have been thoroughly tested, and with very satisfactory results. The engines that are busy generating the electric light at night are, of course, not required for this purpose by day, and it is by day principally that motive power is required for manufacturing or domestic purposes. Thus they may do double duty. There is another direction in which this particular undertaking promises important "results." Ordinarily the exhaust steam from the powerful engines required for such a work is thus wasted, and moreover is rather a nuisance. At Whitehall avenue a contract has been entered into for making it heat the water in the warming apparatus running throughout Whitehall court. The practicability of this has also been extensively demonstrated in America, and great results are anticipated from the adoption of the system in this country.

The work thus described is in itself important and interesting; but it becomes far more so when regarded as the first step in a comprehensive scheme for the whole of London. In its commencement it was the work of the Whitehall Electric Supply Company (Limited). This undertaking has, however, been absorbed into a far larger organization, the Metropolitan Electric Supply Company (Limited) which has been formed with the object of doing for all London, and even for districts outside London, just that which is actually being done for Whitehall. Many of the men who have taken up this work are among those who have pioneered the great enterprises of ocean telegraphy which have linked the whole world together. Sir John Pender, Sir George Elliot, and Admiral Sir George Richards, to mention only three, are names associated with big schemes and scientific and commercial triumphs such as the world little dreamed of a generation ago. With the Whitehall Company's works, the larger company have acquired their interest in a large wharf near the south end of Waterloo bridge, where it is proposed to erect machinery sufficient for 150,000 lamps. They will make this a central station and a general depot, and they will bring in their coal here to great advantage. In addition to this they have taken a site for another central station near Lincoln's-inn-fields, from which we understand they will be prepared to supply electric lighting or motive power over a radius of two miles. The necessary works and plant are in hand, and it is expected that before the coming winter this station will be in working order. A provisional order has been obtained for the construction of works for the supply of electricity over the parishes of St. James, Westminster, and St. Martin's-in-the-Fields, and notices have been served upon local authorities all over London, while negotiations have been opened for the absorption of local undertakings supplying electricity in various parts of the metropolis. Thus it seems more than probable that the coming winter will witness in London that general extension of the use of electricity which we, says the *News*, have long appeared to be on the verge of, but which from two or three causes has hitherto not been realized.

—— The electric light company at Marlboro, Mass., is contemplating the adoption of the Thomson-Houston incandescent system.

ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING AUGUST 6, 1888.

387,276 Electric clock synchronizer; Arthur G. Wiseman, St. Louis, Mo.

387,286 Apparatus for treating noxious gases with electricity; Hartley Fewson, Buckingham, County of Bucks, England.

387,310 Electro-mechanical movement; Richard H. Mather, Windsor, Ct.

387,316 Railway signaling system; Edward L. Orcutt, Somerville, Mass.

387,343 Dynamo electric machine and electric motor; Rookes E. B. Crompton, London, England.

387,365 Electric switch lock; Edward L. Orcutt, Somerville, Mass.

387,382 and 387,383 Electric railway system: David G. Weems, Baltimore, Md., assignor to the Electro-Automatic Transit Company of Baltimore City, same place.

387,432 Armature for dynamo electric machines; Alexander W. Meston, St. Louis, Mo.

387,461 Thermal device for varying electric resistances or currents; Elihu Thomson, Lynn, Mass.

387,463 Electric regulator. 387,464 Regulator for electric currents: Joseph A. Vansant and Frank S. Anderson, Easton, Md.

387,505 Method of measuring electricity; George Forbes, London, England.

387,526 Electric switch; James F. McElroy, Lansing, Mich., assignor of one-half to Lewis C. Butler, same place.

387,585 Auxiliary fire alarm apparatus; Walter J. Dudley, Everett, Mass., assignor, by mesne assignments, to Walter J. Dudley, same place.

387,610 Electrically driven car; Joseph Weis, Jersey City, N. J.

387,615 System of combined arc and incandescent electric lights; Harold P. Brown, Chicago, Ill.

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THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

July 25th, 1888.

The Semi-Annual Meeting of the National Electric Light Association will be held at Hotel Brunswick, New York City, August 29, 30, 31. All communications relating to this Convention to be addressed to

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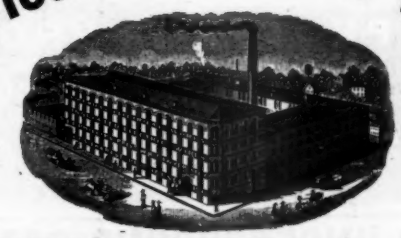

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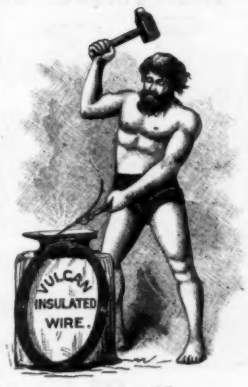

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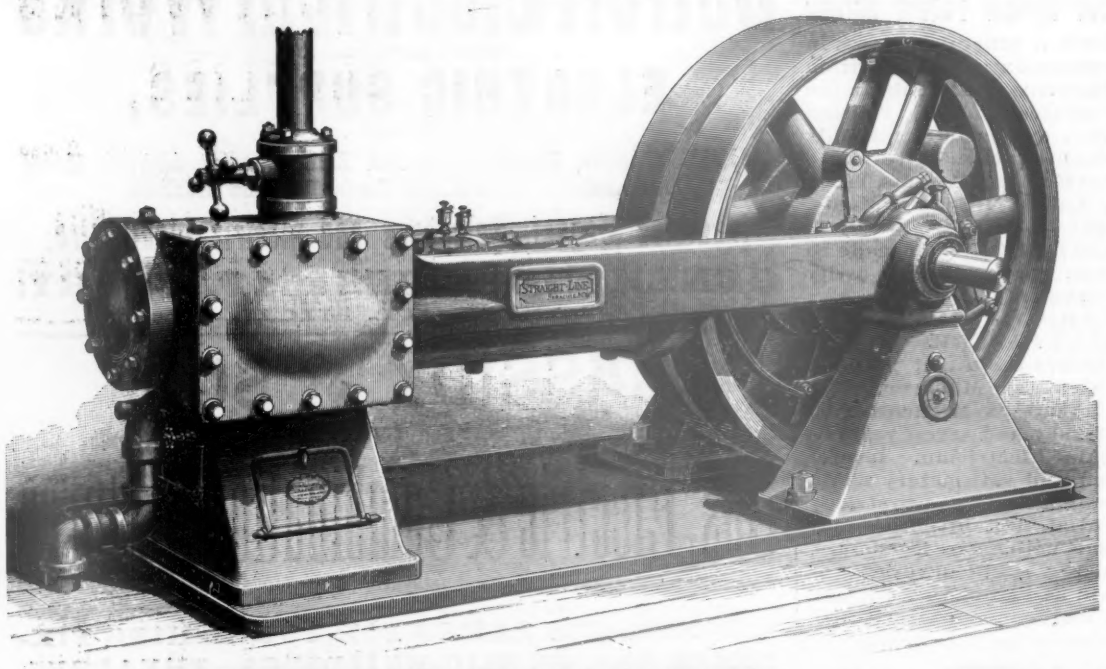

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Yours respectfully,
H. C. MINER.

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Yours respectfully,
(Signed.) J. A. CONNELL,
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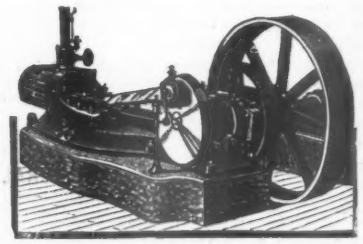

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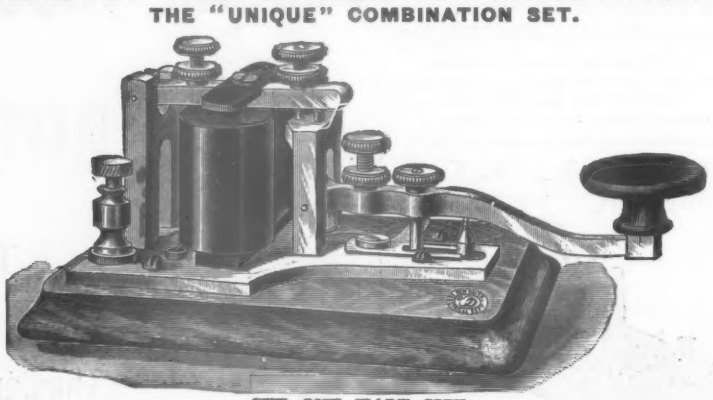
THE "UNIQUE" COMBINATION SET.

This set is manufactured of Telegraph Metal, hand finished, Magnets with Rubber Covers, Nickel Plated Key Lever, all mounted on a Mahogany Base.



The simplest and cheapest combination set ever placed on the market. Key and Sounder mounted on an ordinary size sounder Base. Works well on one cell of Battery.

CHICAGO OFFICE:
315 Wabash Avenue.

CUT ONE HALF SIZE.
The above set complete, with cell of Gravity Battery and 50 feet of wire, $3.75.
SPECIAL PRICES MADE FOR QUANTITIES.